INTERNET ACCESS

HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

SECOND SESSION

OCTOBER 4, 1994

[No. 167]

Printed for the use of the
Committee on Science, Space, and Technology

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WITNESSES

INTERNET ACCESS

TUESDAY, OCTOBER 4, 1994

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON SCIENCE,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:36 a.m. in Room 2318, Rayburn House Office Building, Hon. Rick Boucher [chairman of the subcommittee] presiding.

Mr. BOUCHER. The subcommittee will come to order.

This morning the Subcommittee on Science considers the difficulty that residents in rural and suburban regions of the Nation have in gaining affordable access to the Internet.

Most urban residents live within a local telephone call of an Internet service provider. By paying that service provider's fee, those residents can use their personal computers, modems, and local telephone service to obtain low-cost Internet access. The same cannot be said of people who live beyond the local calling area of the service provider's access node. These suburban and rural residents must pay a long-distance telephone charge on top of the service provider's fee. Whereas the provider's fee may be as little as $20 per month, the long-distance telephone charge averages in many instances $15 per hour during the day time. For these residents, the major expense of Internet connection is the long distance toll charge, an expense that is avoided altogether by their urban counterparts.

This enormous gap in the expense of Internet connectivity between urban residents on the one hand and suburban and rural residents on the other threatens to create a class of information haves and have-nots. It threatens a denial of the growing benefits of Internet access to people who live beyond the local telephone calling area within which the access nodes are placed.

That is the problem we will examine this morning. We will ask about the scope of the problem, about creative ways that some States, localities, and telephone companies are seeking to address it, and we will ask whether there is a role for the Federal Government to assist in the effort to assure low-cost access for all users. It is an important question.

The Internet now offers more than 20 million users immediate access to vast amounts of data, and it offers communications links worldwide. The number of users is growing rapidly, as is the amount of information available to them. People who do not have ready and affordable access to the Internet find themselves at a

growing disadvantage, a disadvantage that will increase with time until the access disparity questions are resolved.

We will be interested to learn from our witnesses today how well the private sector is meeting the challenge of providing ubiquitous, low-cost access to the Internet. We will explore how libraries in some parts of the United States are stepping in to bridge the Internet access gap, and we will examine the optimal role for the Federal Government in ensuring that at this early stage of the development of the global information infrastructure we keep the disparity between our Nation's information rich and information poor as narrow as possible.

We welcome our witnesses this morning, and before introducing them and turning to them for their testimony, I would now like to recognize the ranking Republican member of this subcommittee, the gentleman from New York, Mr. Boehlert.

Mr. BOEHLERT. Thank you, Mr. Chairman.

I'm delighted to be here this morning for a hearing on a subject that will only grow in importance to the national interest. The information superhighway is under construction at a rate that surpasses the speed at which the interstate highway system was built a generation ago, and just as the interstate highway system had a profound impact on American life, so will the information superhighway and the Internet.

I'm sure we are here in the very early stages of Congressional inquiry into the Internet and how it will affect our citizens. Although we are too near the end of the 103rd Congress—time for a group prayer when we talk about that—for this particular hearing to result in an immediate legislative initiative, I'm sure that today we will make an important contribution to the record that ultimately will guide our policy-making efforts.

In that regard, I want to thank all of our many witnesses on both panels who have journeyed here to share with us their views and visions of the future and the needs we will encounter as we make our way along the road.

In particular, I want to thank Ms. Beverly Choltco-Devlin from my own district in central New York. She is director—well, she was the director, now she has got a new job—she is currently a library automation specialist for the State of New York and the former director of the Morrisville Public Library in Morrisville, New York, where she made the kind of contributions indispensable to millions of Americans in similar towns across the country.

We have an obligation to ensure that all Americans have access to the Internet and the information superhighway. The benefits at this point are virtually unlimited.

In July, I learned of an urban school in Union City, New Jersey, where otherwise forgotten and neglected youngsters have achieved accomplishments unimagined only a few years ago thanks to the introduction of modern computing technology and access to the Internet that has opened not only a whole new world but also their imaginations.

This kind of revolution is one that must eventually sweep across the country in a manner that is fair and equitable and of benefit especially to those who need it most. At the same time as we author the rules of the road here in Congress, we must take care that

we build a strong foundation that will encourage innovation and risk taking.

The Federal Government has an important duty in building the information superhighway to the same exacting standards used for our interstate highway system so many years ago and that, as has always been the case with the interstate system, access to the Internet, is simple and widespread.

Thank you, Mr. Chairman.

Mr. BOUCHER. Thank you very much, Mr. Boehlert.

The gentleman from Illinois, Mr. Fawell.

Mr. FAWELL. I have no opening statement, Mr. Chairman.

Mr. BOUCHER. Thank you very much, Mr. Fawell.

We now welcome our first panel of witnesses today, Dr. Mel Heiman, a distinguished orthopedic surgeon from my home town of Abingdon, Virginia, who is very knowledgeable in the use of electronic networks and can talk about the need for better access in suburban and rural areas; Dr. Rivkah Sass, who is the Branch Chief for Public Libraries and State Networks for the Division of Library Development and Services from Baltimore, Maryland; Dr. Michael Staman, President of CICNet, Incorporated, from Ann Arbor, Michigan; Ms. Karen Dillon, Director of the Montgomery-Floyd Regional Library in Christiansburg, Virginia; and we very much welcome you also—from the Ninth District of Virginia, I might add—and Ms. Beverly Cholteo-Devlin who until very recently was with the Morristown Public Library—the Morrisville Public Library, in Morrisville, New York.

We welcome each of you this morning and thank you very much for taking the time to share your thoughts and ideas with us on this very important subject. We will make your prepared written statements a part of our record, and we would welcome your oral summary and ask that you attempt to keep that to something within the range of five minutes. That will give us time to answer questions. We will hear from each of you first, and then we will have questions for the panel.

Dr. Heiman, if you are ready we would like to begin with you this morning, and we would ask that you use the microphone, please.

STATEMENTS OF MELVIN L. HEIMAN, M.D., ABINGDON ORTHOPEDIC ASSOCIATES, ABINGDON, VIRGINIA; RIVKAH SASS, BRANCH CHIEF, PUBLIC LIBRARIES AND STATE NETWORKING BRANCH, DIVISION OF LIBRARY DEVELOPMENT AND SERVICES, BALTIMORE, MARYLAND; ACCOMPANIED BY PAT WALLACE; KAREN W. DILLON, DIRECTOR, MONTGOMERY-FLOYD REGIONAL LIBRARY, CHRISTIANSBURG, VIRGINIA; E. MICHAEL STAMAN, PRESIDENT, CICNET, INC., ANN ARBOR, MICHIGAN; AND BEVERLY CHOLTCO-DEVLIN, NEW YORK STATE DEPARTMENT OF EDUCATION, UTICA, NEW YORK

Dr. HEIMAN. Thank you.

I think individual Americans are discouraged right now—

Mr. BOUCHER. If you could move that a little bit closer, we could hear you better. Thank you.

Dr. HEIMAN. —about their ability to influence government. I think it was Lily Tomlin that said no matter how cynical you get, it's impossible to keep up.

My experience as an individual has been quite the opposite actually. I was concerned about my own frustrations in accessing local networks. I wrote a letter to our local newspaper, and several return letters were published in addition to a headline this last Sunday in our local paper reading, "Mountain empire faces tollgate on information highway."

Mr. BOUCHER. Mel, could I get you to move that closer still? We are still having a little trouble hearing.

That's great. Thank you.

Dr. HEIMAN. I want to thank you for this opportunity. I first was introduced to networks through my teenage son who, like most teenagers, come to this technology quite naturally, and we would play computer games on the Imagination Network together. My interest expanded to other types of networks—Prodigy, CompuServe—that provide some more personal services and also a little broader forum. For me as a rural physician, a limited number of people talk about issues. When national health care was a major issue I really burned up the phone lines on these bulletin boards, having an opportunity to really exchange ideas with people in metropolitan areas.

As far as my practice is concerned, there are a couple of networks, Physicians On Line and then a Medline network provided to the University of Virginia, that allow me to access the National Library of Medicine, a program called "Lonesome Doc" that actually lets me get printed copies of pertinent information about my patients. This area is really expanding very rapidly. Now there is information about drugs, drug costs, drug interactions, help with differential diagnosis, and, as I understand it, a new program for an interactive continuing education that will be possible.

My phone bill really shot up about $100 a month as I began to use these systems because basically all of the access nodes or contact areas were toll charges for me, and in my written testimony I have tried to put down in more detail exactly what those charges are and really my adventures in trying to change that situation. I thought I just didn't understand about calling plans and maybe I could call my phone company and arrange some way to do this with a reasonable expense. Despite what you hear about doctors' incomes, that is still an awful lot of money. I really met with frustration.

There aren't any bad guys in this story. I talked with our local phone company who really couldn't do anything about it. They referred me to the Virginia State Corporation Commission who also could do nothing about it, and they referred me back to the phone company, and then I talked with long-distance carriers and the networks themselves, and the bottom line is that they have to make money to do this, and if establishing a local access node would be profitable I really feel like everybody would be very cooperative and would like to do that.

None of these services are essential to my life right now. I think they add a perspective to it as a rural physician that I would like to keep up. I think the future may hold more advantages where it

may get more and more important to me. Specific access to Internet I'm not so sure should be available to people like me or business people who may be satisfied by these other commercial networks.

My understanding about the Internet is, its initial design was that for a research tool and for people at universities and libraries, and I'm a little bit worried if too many people like me get into that system that don't really need it, it may slow it down or interfere with it doing what it really is intended to do.

I think toll-free access to all Americans to these type of networks is a desirable national goal. It may be some time in coming. I want to make sure that we lay down the infrastructure at least right now so that rural Americans will not be left out of that system.

One approach, of course, could be Federal legislation to say you have to offer toll-free access to everybody. It probably would not be impractical to pass that amount of money on to monthly subscribers to these different networks. I don't think it would be that much. I pay higher malpractice rates and car insurance now for city dwellers. Maybe they could pay for my computer access.

I kind of would rather approach it from a carrot point of view. I would like to see it become profitable, and I think the Federal Government could be helpful to encourage private industry perhaps by sharing technology or research grants or perhaps some new concept, some kind of a supernode.

Right now every network has its own dial-in number, maybe that could be unified to one number and that would have enough people even in rural areas subscribing that it would be financially feasible. Perhaps the Federal Government could offer some incentive that people wouldn't lose money if they got into that kind of venture.

I hope you won't underestimate what rural citizens can provide to this country. We have a lot lower crime rate and less drug use than in the big cities. I think there are some things that we are doing right, and I hope that you won't allow this information superhighway to stay a toll road for our community.

Thank you.

[The prepared statement of Dr. Heiman follows:]

House Subcommittee on Science
Internet Access\ Testimony Dr. Mel Heiman
September 13, 1994\ Page 1

Thank you for the privilege of testifying. I am Mel Heiman, a practicing orthopedic surgeon from Abingdon, Virginia. I was born in Los Angeles, California, and before settling in Abingdon 17 years ago, had spent most of my life in an urban setting. After a year of adjustment, I realized that rural life had much to offer: clean air, a low crime rate, good trout fishing, and a community of generous and hard working people. The negative side is poorly funded schools, isolation from medical and intellectual resources, and the problems of an agricultural society struggling to deal with the realities of modern American life.

The information superhighway offers just what the rural citizen needs: an entry point into mainstream America. To my surprise, however, I found that this highway is currently a toll road to most rural Americans. My frustration in obtaining toll-free entry to computer networks led me to write a letter to the editor of our local newspaper. Since then, many regional citizens have approached me to relate similar experiences. I would like to summarize my efforts, list a few useful networks both for business applications and personal home use, and make a few"non expert suggestions".

BUSINESS USAGE

Computer network access helps me as a physician, and promises yet more in the future. ***Grateful Med*** *and* ***Lonesome Doc*** *are two software programs provided to me free as a courtesy of the University of Virginia. In the comfort of my home I may use the National Library of Medicine and other data bases for information on my patients' problems or prepare as a medical expert in legal cases. Abstracts may be down loaded to my system along with the references so I may choose the articles I wish to have copied and sent to my office. Network charge: Average $1 per search and $6 per copied paper.*
Phone toll charge: $14/hr-day: $7/hr-night.

Physicians' Online *is a new network offering many more services beyond access to the National Library of Medicine: Quick Medical reference(a diagnostic tool to help in formulating illness differential diagnoses), Physician's GenRx(drug prescribing information including drug costs), Topical forums(on subjects such as AIDS, medical computing and health care reform) and global electronic mail service via* ***Internet.***
Network charge: none
Phone toll charge: $14.40/hr-day: $7.20/hr-night

PERSONAL SERVICES

Both ***Compuserve*** *and* ***America Online*** *offer similar services including downloadable software programs, expert computer assistance, forums on timely topics, news, stock quotes, weather, and international electronic mail via* ***Internet.***
Compuserve: *Basic network charge $8.95 per month, extra charges for many features. Phone toll charge: $14.40/hr-day: $7.20/hr-night: 800# $8.70/hr*
America Online: *$9.95 for 5hrs a month(all features), $3.50/hr for each additional hour.*
Phone toll charge: $13.80/hr-day: $7.20/hr-night

FAMILY SERVICES

Imagination Network*(Sierra/AT&T): Entertainment, electronic mail and new educational "school house" feature.*
Network charges: $9.95/5hrs, $49.95/25hrs, $99.95/50hrs/month.
Phone toll charge: $13.20/hr-day, $7.20/hr-night

Prodigy: *Over 800 features including entertainment, educational programs, and electronic mail with* ***Internet*** *access.*
Network charges: $14.95/month-unlimited usage
Phone toll charge: $15/hr-day, $7.20/hr-night, 800#- $7.20/hr

A review of the above clearly suggests that my major expense in network participation as a rural physician is the telephone toll charge. Relatively inexpensive access numbers are slow(1200-2400 baud)leading to a longer contact period to down load files and increased charges. My phone bill skyrocketed to $80-$100 a month from network access tolls.

My first cost saving effort was to contact my local Sprint/United Telephone Company. Although most network contact numbers are out of state for me, my local phone company provides this service. My contact person was very courteous but unfortunately was unfamiliar with computer networks and could not recommend another more senior official with whom to discuss this problem. The minimum rate possible was $10/hr(night) and $18/hr(day). The United Telephone representative suggested I contact the Virginia State Corporation Commission for information on the establishment of local contact numbers as my phone company could do nothing.

The Virginia State Corporation Commission contact was also very pleasant, but told me that I had been mislead and that his agency could do nothing. His suggestion was an 800-type number, as one could not change one number's toll status without affecting the whole dialing area. I was told that a proposal for toll free dialing was recently defeated by voters in the Bristol-Abingdon calling area. Customers balked at having to pay $3.50 more a month in basic charges when they may seldom call into what was previously a toll area. This was not an appropriate problem for the State Corporation Commission. They referred me back to my phone company, the long distance carriers, and the network providers.

I then contacted Sprint/United Telephone, MCI, and AT&T. All three carriers tried to be helpful, but evidently connecting with a more remote node(even with a higher baud rate) offers no savings. Various discount plans can be helpful, but they do not break the $6/hr barrier.

I approached the networks to see what they offer to rural customers. Heavily used"eight hundred"numbers are available at $6-$8/hr but are often busy. A waiting list exists, but new nodes require substantial public subscription. Profitable local access is the key. The variety of networks and contact numbers complicates recruiting enough residents to justify a new node.

At this point I was confused and disappointed. I wrote a letter to our local paper and received quite a response from other similarly frustrated network users. I eventually received a letter from someone conversant with this problem at our phone company. He said that school access to the information highway is a goal, but there are no excess revenues to provide private network contact support. Someone must pay the phone company for installing a local node. Obviously a network will not fund a project without proven profitability.

I feel strongly that equal access to the information superhighway for all Americans is very desirable. Small towns with poor school funding need encouragement to join mainstream America as a step toward realizing their full potential and paying their own way. As a rural citizen I already pay malpractice, home, and car insurance at higher rates because of urban problems as opposed to local experience.

One solution would be to provide toll-free access to all customers. All subscribers could share the additional expense equally on their monthly network membership bill. I doubt this additional expense would be prohibitive and could make network service available to all.

Another idea would be to establish local high speed nodes that could service all networks through an electronic menu or code recognition system. This"super node"would likely have enough customers even in rural areas to be profitable. There are likely other solutions well beyond my technologically naive mind.

How vital to the public welfare is equally affordable contact with the information superhighway? Does this problem justify federal action? Is it best handled in the private sector? I think our federal government can be most effective by providing encouragement and incentives to private industry. Encouragement could come as research grants, sharing of military technology, or perhaps guarantees of a minimum income from"super node"development or installation. We now have the chance to become well informed and educated citizens. I suggest developing an infrastructure now to guarantee affordable access to these wonderful improvements. Please help us take advantage of this excellent opportunity by refusing to allow the information superhighway to become a"supertoll road"for rural America.

Thank you,

Melvin L. Heiman, M.D.

Mr. BOUCHER. Thank you very much, Dr. Heiman, for that thoughtful remark.

Ms. Sass, we will be pleased to hear from you.

Ms. SASS. Thank you, Mr. Chairman.

As you know I'm the understudy for this particular testimony. I'm here to talk about the Sailor project—Ms. Barbara Smith is not able to be with us today—and then I have some comments because I'm new to Maryland. I just moved here from the State of Washington, also a rural State, and I talked with some folks back home who are in rural areas who are, I think, as frustrated as Dr. Heiman and the rest of us who just want access.

But first the Sailor project. The Sailor project is a cooperative effort by the more than 400 libraries in the State of Maryland to create a toll-free infrastructure, if you will, for access to the Internet, not total access, not complete access, but we are trying to gather resources that will be useful to citizens. The Sailor project grew out of libraries getting together to try to solve library-related problems and coming up with the idea that the biggest obstacle for folks is the fact that it is a toll call when you live in western Maryland or the Eastern Shore or somewhere that is not metropolitan Baltimore or suburban Washington. And what Sailor simply is, is an Internet gopher, and, in addition, once people connect to Sailor they are using—they are using that gopher, and then they have the option if they have Internet accounts of using electronic mail and the other resources available on the Internet. What it is doing for Maryland—the project is not yet complete. We are building the telecommunications network right now, and I think it is an excellent example of cooperation, because Sailor is building on existing—the existing University of Maryland network. They are providing cooperation, and then we are building—installing telecommunications nodes in various parts of the State so that it really will be a toll-free call for people everywhere in Maryland.

The kind of information that we are putting on Sailor includes all of those resources that you find on the Internet as well as information unique to Maryland so that a citizen can find out population trends, can look up what the major agricultural activities in a particular county might be, and use that information.

We like to think that while it is useful for the citizens of Maryland, because it is an Internet resource, it also brings Maryland to the citizens of the world. So if someone is looking to relocate a business or wants to find information about Maryland, it's there, and we want that kind of information out there. This was built by librarians. Librarians have a great love of gathering and organizing information, and that is what we want Sailor to accomplish.

The kinds of things that it is being used for right now include students, because it is available in schools, and it is being used by people at home, it is being used for searching for jobs, for example. There are a number of wonderful stories about how people are already using Sailor and integrating it into their lives.

In terms of what it offers as a library initiative, it is simply a different format. Libraries have organized and gathered information in the form of books. We move in different formats, and now we are in our own way entering the electronic age, and I'm really

pleased and proud to be a part of this project. It does answer some of the concerns. That local phone call is what everybody wants.

As I mentioned, I came from Washington State, and when I called the Director of the Pend Oreille County Library—that is in the northeastern portion of Washington State; it is a highly technical little library that serves a community of about 5,000 people, a county of about 5,000 people—and the director of the library said the problem in a rural area is that you pay twice essentially. Because it is a toll call, you are paying—you are paying for what people in urban areas get by picking up their telephone and dialing a seven-digit number, and that is not equity, and she wants to offer equity to her community, and when you have to pay twice as much it's not equity.

There aren't enough people in rural communities to make that density of return, I guess, for the profit, and she said people aren't asking for it to be free, we just want the same access that other people have. And there are additional problems in rural areas. As she said to me, most of the phone lines were laid shortly after Moses parted the Red Sea, and there are some difficulties with the connectivity, the physical connectivity.

I talked with someone else who works for the Utilities and Transportation Commission in Washington State, and his response was, let's not worry about the infrastructure, it will all be satellite in a few years anyway.

But as I talked with various people—and I wish I had more time; I know I'm running out of time—I'd like to tell you about the Onalaska School District, which is 120 miles southeast of Seattle, literally in the middle of nowhere, and they have taken what I think is a wonderful model in some ways. All the school districts in Washington State—I assume it's the same everywhere—have to supply certain information to a central data processing network.

They have connected to that central network. This is a school that serves 990 students K-12. They have piggybacked on that existing network, and they have provided Internet access to more than 600 students in their school districts. Anybody from fourth grade on up can have an Internet account. In addition, they have opened up a lab four nights a week until 8:30 at night so that people in the community can come in and learn how to use the Internet and explore those resources, and this is an area with a 20 percent unemployment rate. It is a timber community that lost its livelihood a few years ago, and these folks are really suffering.

It is not free though. They pay a significant amount of money for this access. They have given up other things to have this, and as I look at examples like this I keep thinking, why should they have to pay more when they are already at an extreme disadvantage? They should be able to connect at the same rate that folks in Seattle or folks in Baltimore or folks in suburban Washington can.

I really thank you for the opportunity to express my opinions, and I will be glad to answer questions later.

[The prepared statement of Ms. Smith follows:]

Navigating Maryland's Online Information Network

Testimony of
Barbara G. Smith

on behalf of
Maryland's Sailor Project

before the

House Subcommittee on Science

September 13, 1994

INTRODUCTION

My name is Barbara G. Smith and I am the Project Manager for Maryland's Sailor Project. I am a librarian on the staff of the Division of Library Development and Services of the Maryland State Department of Education. My office serves as the state library agency for Maryland. I have coordinated the Sailor Project since its inception in the Summer of 1992.

I am here today representing the Maryland Library Community, which comprises some 425 libraries, including the state's 24 public library systems, 24 public school systems, 60 college and university libraries, and 300+ special libraries and private and parochial school libraries. The library community, under the leadership of the Maryland State Library Network Coordinating Council and the state library agency, is responsible for the development of the Sailor Project.

Voice (410) 333-2123 ❑ FAX (410) 333-2507 ❑ TTY/TDD (410) 333-6442 ❑ Internet: sailor.lib.md.us
Maryland State Department of Education Division of Library Development & Services
200 W. Baltimore Street / Baltimore, MD 21201

Sailor provides Marylanders of all ages and situations in life with access to local, state, federal, and international information resources through their local library and by dial access. It provides access without charge to Sailor's Internet "gopher" with its simple menus and wide variety of useful resources These services are supported by a telecommunications network that will include all 24 counties by July, 1995. My testimony describes what the Sailor Project will offer Marylanders and how the Sailor Implementors are making that happen.

BRIEF BACKGROUND ON THE SAILOR PROJECT

Sailor grew out of an effort by Maryland librarians to electronically connect library and other resources to help residents get the information they need for school, work and day-to-day life. In the summer of 1992 a working group appointed by the Maryland State Library Network Coordinating Council, a group representative of the state's libraries, developed *The Seymour Plan: Electronically Connecting Maryland's Libraries*. (Seymour, the original name, was changed to Sailor in May 1994.) The plan calls for the implementation of a statewide telecommunication backbone that provides local, toll-free access to Sailor services in every county. The Sailor system will enable people to search the on-line catalogs of Maryland and out-of-state libraries, get local community services information, have access to a wide range of local and state government information, and provide a doorway into the Internet. When complete, the Sailor Project is envisioned to be Maryland's Public Information Network.

The Seymour Plan was accepted by the Library Community and implementation was begun in December 1992 when the Sailor Implementors Group began its work. Since then, about 125 librarians, computer and network specialists, and some citizens have worked make Sailor a reality. On July 27, 1994, Sailor was opened to the public when the Enoch Pratt Free Library in Baltimore released the phone number for the modem pool at that site and linked Sailor to the library's on-line system. A second library system, Anne Arundel County, released its phone number on July 28, 1994. Twelve more sites will be operational by the end of September, 1994.

WHAT SAILOR OFFERS MARYLANDERS

- An 8th grader, working at home on an assignment, dials into Sailor on a home computer to check a dictionary and a thesaurus. While on-line, he checks a song lyric archive for the words of a song he likes, and wanders through some of the other music resources on the Sailor gopher.
- An unemployed woman goes to her local public library to use Sailor to get job information. She searches the *Occupational Outlook Handbook* to get more information about work she might want to pursue, then checks the roster of positions open in Maryland State Government and another file for federal openings.
- A school library media specialists in a technical high school in Baltimore County helps a faculty member to locate magazine articles about optical scanning equipment. She also finds information for the teacher about a listserv (discussion group managed through Internet electronic mail) on sky diving, the teacher's personal interest.
- A college student searches the on-line catalogs of a number of Maryland universities, the Library of Congress and universities in the Washington metropolitan area to find books and journals needed for a paper. By using Sailor, she is able to identify where the materials are located and whether they are checked out or are available. She can check out several items from the local university's library; the others will be requested through interlibrary loan.
- Staff at the Maryland State Archives in Annapolis work with Sailor's technical staff to develop the Archives' information server. Starting with some directories and indexes issued by the Archives, the information server will eventually provide Marylanders and anyone on the Internet with access to their tremendous resources. Plans are underway to optically scan images in the Archives photograph and manuscript collections, as well as to provide on-line access to materials previously available only in print.
- A Laurel City Councilperson contacts Sailor to explore the possibility for making Council agendas, minutes, reports and other information available through Sailor.

Each of these vignettes is happening now in Maryland. Marylanders have three ways they can use Sailor's services, all without charge.

1 *Visit their local library.* Sailor will be available at least one branch of every public library system in Maryland by July, 1995. In the systems with an on-line public access catalog, Sailor will be available in every library location. This means that anyone who can visit the library will be able to become acquainted with what the Internet has to offer and to locate information they need.

Sailor will also be available in many school library media centers, college and university libraries, through campus computer networks, and in special libraries of all kinds. In the future Sailor planners would like to have kiosks in malls, grocery stores and government offices.

2. *Dial into Sailor using a computer with modem* Anyone with a modem-equipped personal computer, access to a telephone line, and the local phone number for the Sailor network library closest to them will be able to dial into Sailor. Currently people dial in from home, office and schools.

3 *Telnet into Sailor* People who have Internet telnet capability will be able to go directly to the Sailor workstation by using either of these addresses: **sailor.lib.md.us** or **192.188.199.5.** Sailor welcomes Internet travelers.

The two developments that make it possible are the implementation of the telecommunications backbone and the Sailor gopher, which are described below

SAILOR'S TELECOMMUNICATION NETWORK

Sailor's Telecommunication Network is an extension of the backbone established by the University of Maryland System (UMS) to connect its 13 campuses. In partnership with UMS network engineers and administrators, Sailor Implementors developed an architecture that will be implemented in two phases and is scalable to accommodate future growth

Phase I, Project Backbone. The first phase of implementation will place telecommunication equipment and leased lines in 14 public library and several university sites across the state. When this phase is complete in late September, 1994, approximately 86% of Marylanders will be within a local phone call of

Sailor (if they are dialing in). Several sites serve neighboring counties that can dial in through a local phone call. Those counties are listed to the right.

Anne Arundel County Public Library	
Enoch Pratt Free Library (Baltimore City)	
Baltimore County Public Library	
Carroll County Public Library	
Cecil County Public Library	
Frederick County Public Library	
Harford County Library	
Howard County Library	
Montgomery County Dept. of Public Libraries	
Prince George's County Memorial Library System	
Southern Maryland Regional Library (St. Mary's)	Charles
Talbot County Free Library	Caroline, Queen Anne's
Washington County Free Library	
Wicomico County Free Library	Somerset, Worcester

Several University of Maryland campuses provide essential telecommunication links: College Park, Baltimore City, Frostburg State, and Salisbury State Frostburg State will also have equipment and lines to serve Allegany County Sailor dial in users

This combination of installation sites is based on several factors:

the availability of UNIX-based public library local on-line systems that are or can be made TCP/IP compliant.

availability of PRI (primary rate interface) ISDN service in a given geographical area

cost of leased lines per annum.

funds available in Federal Fiscal Year 1993 from Library Services and Construction Act (LSCA) Titles I and III.

The team that designed the architecture recommended use of ISDN PRI lines, which offer 23 channels and 56kb bandwidth. The telecommunication equipment installed in each site is an Ascend Pipeline MAX 1600, a single unit comprising a router, terminal server, CSU/DSU, and modem chips. It supports data and video applications, though the initial use will be data only. The network is being installed by Critical Communications of Lanham, Md., in conjunction with Bell Atlantic, from whom the lines are leased. Each installation includes 16 local dial-up lines, a total of 192 statewide. This is the initial installation; the design team is already planning expansion of the modem pools.

Phase II, Project Linkup: This phase will complete the Sailor statewide network by establishing local phone call access in the remaining counties (Garrett, Kent, Calvert, lower St. Mary's and Dorchester). Planning is currently underway and implementation is expected to be completed by June 30, 1995. This phase will also include expansion of the Phase I network to increase the number of incoming lines available for dial access users.

The network design team will also look at the expansion necessary to support applications like MOSAIC and Cello, which require higher bandwidths than the current network provides.

Future expansion of the Network: The Sailor Telecommunication Network is a foundation system that was designed to demonstrate the possibilities and to expand to meet demand. Even as Phase I of the Network is being installed, a number of institutions are actively planning for how they can link to it. For example, Wor-Wic Community College in Salisbury is building a new campus that will be fully wired for internal and external communication. They are investing in Ascend equipment and will lease a line to link up with the Sailor Network. A number of public school systems are planning their networks, including Internet access, and they want to connect to Sailor Since every situation has its own special conditions, each of

these of these efforts requires considerable technical assistance from Sailor network designers, Bell Atlantic, and Ascend. The potential for linking libraries, K-12 education, higher education and other institutions like local government is tremendous.

SAILOR'S INTERNET GOPHER

Regardless of how people get to Sailor, what they find is an Internet gopher that organizes a wide range of resources within simple menu structure. Gopher software, which was developed by the University of Minnesota and is made available without charge, provides access to character-based information, whether it is mounted locally or is "pointed" to across the Internet. There may not be pictures, except those one can create with ASCII characters, but the text possibilities are fantastic.

The original *Seymour Plan* does not mention gophers, since they were not known to the planners. Someone from the Computer Science Center at the University of Maryland at College Park offered the use of a computer and arranged dial in access for the library community to the UM modem pools at College Park and Baltimore. A programmer was hired to develop the first Sailor gopher, which included access to a number of library catalogs and many Internet resources. That gopher was made available in June 1993 to the library community and anyone else who could find it. Use of this original gopher grew from 560 root connections in June 1993 to 18,500 in May 1994. It provided Sailor Implementors with a great opportunity to learn about gophers, to make state and local files available, and to acquaint librarians with what Sailor can do.

The current Sailor gopher is mounted on a new Sun workstation located at the Enoch Pratt Free Library. The Pratt Library is the State Library Resource Center for Maryland; it is the operational center for the Sailor Project. This gopher was developed over a four month period by two librarians who gave up many weekends to work on it. Librarians have been organizing access to the world's resources for centuries. Sailor's gopher is an example of how we are providing effective access to the chaos of Internet resources. One can find reference sources like dictionaries, consumer information like Maryland's Lemon Law, look

at the on-line catalogs of libraries in Maryland or around the world, check the current weather in Washington, D.C. or Anchorage, Alaska, or look for information on a nearly infinite variety of subjects, from bird watching to NASA space projects. Marylanders can read the Constitution, search the current Federal budget by word or phrase, and read recent Supreme Court decisions. Sailor Implementors have only begun to make Maryland information available through the system. Approximately 300 people at any given time can use the Sailor gopher.

An ongoing feature of the Sailor gophers has been *Feedback, Please*, which enables users to leave comments and suggestions for Sailor Implementors. Here are some recent comments.

> "This service has afforded me the first opportunity to explore the Internet and I am amazed at what I have found. I can do this for hours... "
>
> "Wanted to let you know that Sailor is GREAT. Only problem is its popularity, but additional lines will ease access. Thank you for putting some of [our] tax dollars to good use for all citizens of MD."
>
> "Greetings from Colorful Colorado! I'm happy to be a regular visitor in your fine state, as my parents live in Bozman, on the Eastern Shore. My brother and I are trying to get my dad on the Internet, and your state's proposed free access is an excellent idea! The information highway should not be a toll road if everyone is to be able to use it."

The kinds of problems people report are usually related to their telecommunication connection or accessing remote resources in the ever-changing Internet environment. It is clear that ongoing personal support will be needed to help people resolve their connectivity problems and to understand what Sailor is and what it isn't. HelpDesk service is available at the Enoch Pratt Free Library, where a staff of 3.5 FTE answer

questions by phone and e-mail weekdays from 8:30 - 5:00. The HelpDesk phone number is (410) 396-INFO, and the e-mail address is **helpdesk@epfl1.epflbalto.org**.

EVALUATING SAILOR

Sailor is a "bleeding edge" project that is unique among the states. Sailor Implementors are anxious to evaluate the project in ways that will help to improve the operation of the system and will measure the impact Sailor has on Marylanders. Questions to be answered range from the number of dial-in users to how school children are using Sailor to meet their information needs. The Implementors gladly share information that can help other groups interested in launching similar projects.

SAILOR FUNDING

Sailor's funding to date has been Library Services and Construction Act (LSCA) funds from the U.S. Department of Education. LSCA funds have been used in Maryland to develop a statewide union database, initiate a consumer health information project among 21 library systems, and to start a wide range of library services in every part of the state. Sailor is Maryland's most ambitious LSCA project to date, and it marks a new phase of need for LSCA authorization and appropriations to seed information technology projects and efforts to serve special populations through the nation's public libraries. Here is a synopsis of the funds:

Federal Fiscal Year 1993:

Title I	$265,042 for network installation, phone line leases, Internet license through SURAnet
Title III	$366,758 for hardware
TOTAL	$631,800

Federal Fiscal Year 1994

Title I	$300,000 for training and marketing
	200,000 for Information & Referral and commercial databases
	578,692 for Sailor personnel, Network expansion, interlibrary loan system development
Title II	$330,049 for local libraries' Sailor technology applications (This is a 60/40 match.)
Title III	$214,602 for Sailor interlibrary loan and Network development
TOTAL	$1,623,343

The Maryland State Dept. of Education has initiated a request for an increase of $835,000 in state funds to State Library Network funding in FY 1996, which begins July 1, 1995, to sustain Sailor's Network, staff, and ongoing operational costs.

The Sailor Project is also interested in National Science Foundation or National Telecommunications Administration funds to initiate development of a MOSAIC or other graphical user interface and to expand the telecommunication network to support it. Implementors are discussing possible collaborative efforts with agencies involved in geographical information systems (GIS), delivery of information and referral (I&R) directory assistance through police cars and other innovative uses for Sailor

SAILOR STAFFING

Sailor's development has been accomplished through the efforts of about 125 librarians, network engineers and citizens who worked in 10 task groups, from marketing to telecommunications. They were able to get

release time from their regular work, and many paid their own travel cots to get to meetings.

Starting this spring, Sailor funds supported the hiring of the HelpDesk manager at the Pratt Library and a data administrator/programmer who will take over the management of the gopher. A network support person will be hired when the installation of the backbone is completed. Numerous staff in the state library agency at the Maryland State Department of Education have Sailor assignments, which will continue through the next two fiscal years at least.

INTERNET ACCOUNTS

Since *The Washington Post* article about Sailor made the front page in late June, many Marylanders have called to ask about accessing Sailor and getting Internet accounts. There is some confusion about whether not one needs an Internet account to use Sailor services.

Sailor's gopher can be used without an Internet account, nor does one need a special ID or password. People can print the information on the screen (called a "screen dump") and, if their telecommunication software handles it, they can download files into their personal computer. Many people will find that Sailor meets their needs.

For people who want to be more complete Internet users, accounts are available now from one public library system (the Enoch Pratt Free Library), and other libraries will offer similar services within the coming year. Pratt offers basic electronic mail accounts that come with 1 mb of computer storage for $35 per year. If you want access to the Internet tools ftp (file transfer protocol) and telnet, an account that supports them and e-mail with 5 mb of storage will cost $100 per year. Pratt has set the prices to enable them to recover costs and continue to expand their account support capacity

Pratt is the recipient of an LSCA Title II grant that will enable them to establish a large block of accounts that will be allocated to the public library systems in the state. Libraries are encouraged to open these

accounts to local government, library trustees and others. It is likely that Maryland libraries will be the way that many public officials and employees become Internet users.

The K-12 education community in Maryland is eligible to receive Internet accounts without charge through METNET, a project funded by the State Department of Education and based at the Enoch Pratt Free Library. Accounts are also available to educators through the University of Maryland College Park. Eventually the Sailor telecommunication network will support METNET users. Links between the two systems are being established, and coordination between the two projects will ensure that they continue to work in parallel and not in competition.

SAILOR'S FUTURE DEVELOPMENTS

Sailor Implementors are currently developing an implementation plan that will cover specific developments over the next two years, with projections for two more years. Here are some of the anticipated developments:

- An electronic interlibrary loan system designed to function within the Sailor system will be implemented by July 1995.
- Some commercial databases, such as an article index with document delivery capability, will be made available through Sailor, enabling people to order copies of articles using a credit or debit card.
- A substantial number of state government resources will be made available through Sailor. Some files will be loaded directly on the Sailor gopher; others will be maintained on information servers established by state agencies, following the model of the Maryland State Archives. These will be available to Marylanders and to all Internet users.
- Many librarians and residents will learn about Sailor and the Internet, including how to connect and take advantage of the resources available.
- Sailor will be a catalyst for connecting state and local government to the Internet, empowering employees and officials to use the tremendous resources and personal networking available to them.

- Sailor will become a routine way for Marylanders to get the information they need for their every day lives, regardless of where they live and their personal circumstances.

HOW THE FEDERAL GOVERNMENT CAN HELP

Federal funds can provide the seed money for demonstration projects like Sailor.

Sailor is available to Marylanders today because Library Services and Construction Act (LSCA) funds provided the seed money to start the project. Sailor's demonstrated success enables us to seek State funding for ongoing maintenance and development costs. It would have been virtually impossible to get state seed money for a project like Sailor, but for ongoing costs we may be successful.

Sailor Implementors will apply for Federal grants through the National Science Foundation and the National Telecommunications and Information Administration for seed money to develop more specialized Sailor projects. For example, we are interested in significantly expanding the telecommunications network for the eight Eastern Shore counties and developing an information server that will increase access to community information/referral (I&R) files and local government resources. The capstone of the project would be to open links for police and other agencies to use the I&R and other government information in delivering citizen services. Imagine a police officer checking the Eastern Shore server to get information about a local women's shelter to give to someone caught in a domestic violence situation.

Continue Federal subsidies of the nationwide telecommunication backbone that interconnects the mid-level networks like SURAnet.

This is important for two reasons. First, projects like Sailor will require increasing bandwidth to support applications like Mosaic. There is concern that commercializing the nationwide backbone will increase costs beyond our ability to pay. We may not be able to take advantage of Internet developments that are new today, but standard tomorrow. Second, I believe Sailor will provide the incentive for school systems and other

institutions to install phone lines and buy computer equipment necessary to access Sailor and the Internet. We are not asking for Federal funds for these purposes. But if the ongoing costs are beyond their ability to pay, the phone lines and equipment may never be purchased.

In summary, we ask for continued Federal support for seed money for demonstration projects and to subsidize the nationwide telecommunication backbone that makes it possible for Marylanders to be Internet users.

Thank you for this opportunity to introduce Maryland's Sailor Project. I hope you will pay Sailor a visit soon.

SAILOR™

A Project of the Maryland Library Community

Navigating Maryland's Online Information Network

How to get to Sailor

There are three ways you can get to Sailor:

1. **Visit your local library and use Sailor at one of its computers.**

   Using a computer at the library, you will be able to use Sailor. In many libraries, you will use the same computer for Sailor as you use to check the library's catalog of materials. Most Maryland public library systems will make Sailor available to people who come to the library. Ask your local librarian when you will be able to use Sailor at your library.

2. **Connect to Sailor by using a personal computer equipped with a modem.**

   If you have access to a computer equipped with a modem, telecommunication software and access to a telephone line, you can dial into Sailor through a public library. These library systems have made their phone numbers available; more systems will open access through early Fall.

Enoch Pratt Free Library:	**(410) 605-0500**
Anne Arundel County Public Library:	**(410) 573-3800**
Carroll County Public Library:	**(410) 848-1230**
Harford County Library:	**(410) 273-7600**

   Follow these directions to dial into these libraries:

   - Set your telecommunication software to your modem's highest speed (from 1200 to 14,400 baud). Set 8 data bits, no parity and 1 stop bit.
   - Add the local phone number to your telecommunication software.
   - When the modem has connected to the library system, press Enter.
   - You should see a "Welcome to Sailor" message and a short menu. Type "2" and press Enter.
   - At the "login" prompt, type "gopher" and press Enter.
   - At the "password" prompt, just press Enter.
   - You should see a short welcoming screen and a request for your terminal type. If you are set to a **vt100** emulation, just press Enter. That will bring up Sailor's main menu screen.

Sailor is an easy system to move through. Follow the simple instructions on the screen. If you don't know your choices at any point, just put in a question mark and press Enter.

3. **If you have Internet telnet capability, you can telnet directly to Sailor using one of these addresses:**

   192.188.199.5 sailor.lib.md.us

September 6, 1994

Voice (410) 333-2123 ❑ FAX: (410) 333-2507 ❑ TTY/TDD: (410) 333-6442 ❑ Internet: sailor.lib.md.us
Maryland State Department of Education Division of Library Development & Services
200 W. Baltimore Street / Baltimore, MD 21201

Mr. BOUCHER. Thank you very much. That is extremely helpful.
Ms. Dillon.

Ms. DILLON. Good morning.

Montgomery-Floyd Regional Library I hear is considered unique. We are unique in some cases by being represented in Congress by Mr. Boucher, which is very helpful— certainly got people to thinking at the local level. We are also located next door to Virginia Tech and all their technical resources, which is extremely helpful. We are a partner in the Blacksburg Electronic Village, called BEV. We have been involved with the Library of Virginia and its leadership, they have carefully focused their LSCA funding to help support, I think, a pretty organized program for Statewide network development. And the library has received two LSCA grants totaling $97,000 in the last year and a half, and this helped us buy the computers, bought the telecommunication, provided training, and supported an evaluation component that helps test the validity of public access in a public library. So that is what we are really about, looking at the role of the public library for free public access.

During our first eight months of operation 63 percent of our 60 staff members have acquired connectivity through a dual system, and this is again why we are somewhat unique—through a broad band access and then dial-up access over an 800 number managed by the State Library out of Richmond.

We have had library users connect over 20,000 free sessions on those seven work stations that LSCA bought. We have received State and national media coverage including NBC Nightly News, and this is quite a thing for a very small community. We have had visits from Bell Atlantic executives and Virginia's lieutenant governor. We have also established new partnerships that we didn't have before with businesses, local government, schools, social service agencies, and Bell Atlantic has been our most valuable partner during this process.

Since January of 1994 we have trained 500 of the 20,000 Blacksburg residents in a variety of Internet application activities. We have also provided information to 500 staff members from other libraries in the State and also nationally. We have been down to Mississippi; we are going to Florida next month to give an overview of what we have been doing; we have also made presentations to the national level, the National Commission of Library Information Services and the National Center for Education Statistics.

In the last three months our staff of 60 have attended about 40 hours of training that is directly connected to what we are doing, and this is a lot of time and effort for a relatively small staff and a real tight schedule. We have realized that this training is perhaps the most valuable and necessary contribution that the library can make. It is expensive. We estimate that about 60 percent of that $97,000 has gone to support training activity. And the evaluation model that we have developed and also posted on the Internet for other libraries' use resulted in part from the Tell It model which was funded by the U.S. Department of Education Office of Library Programs.

From our evaluation, we have determined that 33 percent of the people who have used this service do not own a computer, 69 percent of these people are new library users, so this is why they

walked into the public library, and about 54 percent determined that this is the only Internet access that they have. We have 51 percent of the people using the service using it for educational purposes, and 87 percent have found that it is very helpful in meeting educational needs.

So we have determined that we have done a good training job, this is a valuable role for us, and we have provided both structured training and unstructured training so people can just come in and sit down and learn on their own.

The NII is about change. It is not an easy thing to manage as an administrator. It has been a real transition for staff. Our local funding authorities still find it somewhat curious, and we are doing a lot of communication as to its value. We have been able to do a lot simply by having a very "can do" attitude, and some very creative staff members. We have had to take some risks, and we have had to make adjustments along the way. Things change, and new technologies occur, and we have to take advantage of what is possible.

In talking to Audrey, she asked that I suggest some feasible specific things that both the Federal level could do, then also what the telecommunications industry might be able to do to enhance affordable access, so I want to now move on to some specifics.

At the Federal level, it is, I think, extremely important that universal access be mandated. There is certainly much need for funding, and I think there is a perception issue here that needs addressing. I would urge the Federal level to follow the leadership of Congressman Rick Boucher who told me on July 18, 1994, last summer—he sponsored a telecommunication conference in Blacksburg—he said that a node should be placed in every public library. I think that is a doable thing.

On the same day, FCC Chairman Reid Hundt stated that the FCC has authority to set tariffs to ensure access. Okay, let's do it. I think we need preferential rates, and there needs to be regulatory reform from what I have heard and what I have read. The 5 percent capacity set aside, I think, is a reasonable beginning.

As far as funding, as the former Virginia LSCA coordinator, I feel strongly about LSCA and what is it is able to do. I think LSCA Title III, which is for cooperative network development, gives us the most return for the investment. I think LSCA needs to be reauthorized with a strong focus on technology and network information, and then I think libraries need access to as much grant money as possible. My library personally has a $220,000 application pending for NTIA, and we were real pleased to see that $64 million had been designated for the next year. Next year I think that needs to be increased because there is a lot of need.

And then perception. I think a strong message needs to be sent down to the State and local level that libraries are an integral part of the educational process. There is no question about this. We need to encourage partnerships with schools and government and the private sector, and priority needs to be given to funding these relationships.

For the providers I have identified three areas: Marketing, collaboration and connectivity. I think the greatest barrier facing public libraries, as we have already heard, is the cost of access. For ex-

ample, next year I expect my telecommunication budget to perhaps double, if not increase more, and I'm looking at at least $30,000, and that is a lot from my $1 million budget.

I think collaborative relationships are extremely important. Our Bell Atlantic relationship has been very useful to us, and I think the providers need to involve libraries in their planning and their policy development. Also, their research needs to be focused on open network standards, lower cost, and I think there has to be a win/win opportunity here, and that precludes the nonnegotiable mind set. Comprehensive regulatory reform is a must.

We need, I think, at the minimum, access to broad band connectivity, not the less effective dial-up. And I appreciate this opportunity to express my experience.

Thank you.

[The prepared statement of Ms. Dillon follows:]

Statement of

Karen W. Dillon

Director, Montgomery-Floyd Regional Library

Christiansburg, VA

to the

U.S. House of Representatives,

Committee on Science, Space, and Technology

September 13, 1994

Prepared by MFRL Staff: Steven P. Helm and Bradley Nash, Jr.

The Advent of Universal Access to the NII

In January 1994, the Blacksburg Area Branch of the Montgomery-Floyd Regional Library (MFRL) in Blacksburg, Virginia began a unique testbed project which is helping define the future role of public libraries in the information age. Integral components of this project include: the deployment of broad-band universal access to the National Information Infrastructure (NII), client/server architecture, ongoing public training workshops, intensive staff training, and comprehensive evaluation of the project.

Library Background

The Montgomery-Floyd Regional Library (MFRL) is a regional public library system serving the 85,000 citizens of Montgomery and Floyd counties located in the 9th Congressional District of scenic Southwestern Virginia. Within the counties are the towns of Floyd, Christiansburg, and Blacksburg, the home of Virginia Polytechnic Institute and State University.

Private and Public Partnerships

The library project developed as a result of unique public/private partnerships, two Federal Library Services and Construction Act (LSCA) subgrants, and an alliance with a more extensive community project called the *Blacksburg Electronic Village (BEV).* MFRL broad-band connectivity to the NII is through the Blacksburg Electronic Village which utilizes Virginia Tech's SURANET node. As envisioned, the BEV project brings public Internet access to the entire Blacksburg community: to homes, schools, businesses, and civic organizations. *(see Appendix section "What is the Blacksburg Electronic Village?")* The MFRL project and Blacksburg Electronic Village are supported by the contributions of both private and public partners:

Virginia Polytechnic Institute and State University

Members of the BEV project management group are drawn from the staff of Virginia Tech's Computing Center. They manage the project, including designing and printing materials; handling public information and registration; packaging software and user support information; maintaining information servers; developing local information resources; and coordinating research and project development efforts. Technical support for BEV participants is provided by the User Services. Network connection services are provided by Communications Network Services. It is through the support of Tech's entire Information Systems division that BEV users have access to a wide range of network services. The BEV project management team is to be highly commended for facilitating the availability of free e-mail accounts for in-library use for any MFRL patrons.

Bell Atlantic - Virginia

The ability of Blacksburg residents to make network connections in their homes using technologies such as ISDN and Ethernet is made possible by the visionary provision of these services by Bell Atlantic Corporation. Bell Atlantic has cooperated with several Blacksburg apartment complexes to install internal wiring and 10BaseT ports, and has connected the complexes via T1 links to Blacksburg's

Central Telephone Office. Bell Atlantic has also donated eight months of T-1 data line service and a CSU/DSU to the MFRL project, thus providing the Blacksburg Area Library with a high speed network connection for public workstations that is freely accessible to anyone who uses the library.

The Town of Blacksburg
The development of local information resources could not take place without the support and participation of the Town of Blacksburg. One of the primary goals of the project is to develop an accessible and dynamic local information infrastructure which serves the needs of citizens and fosters community awareness and communication. The Town of Blacksburg is progressing toward expanding its on-line offerings, from e-mail interaction with departments and personnel, to information on resources and services, to scheduling postings for activities such as community softball and street cleaning. The key players in the success of the project are, of course, the citizens of Blacksburg.

Xyplex Inc.
Another facilitator in the MFRL project has been Xyplex, Inc. which donated a 20 port hub/router for the library's local area network. This state-of-the-art equipment allows high speed connectivity from the library staff and patron workstations to the world-wide Internet.

Library of Virginia and LSCA
MFRL was awarded two Library Services and Construction Act (LSCA) subgrants: $57,000 in 1993-94 and $40,000 in 1994-95. The LSCA funding administered by the Library of Virginia, has allowed MFRL to purchase necessary hardware, software, and supplies for the project as well as hire electronic reference staff to train the staff and public on Internet use, collect data on the project, and perform traditional reference services and online searching using the Internet.

Project Goals
The ultimate goal of MFRL participation in BEV was to support the information and communication needs of the regional library community regardless of whether or not individuals can afford to own a personal computer and pay the monthly BEV subscription fees for home access. A BEV project feasibility study conducted in 1991-92 discovered that approximately 50% of Blacksburg residents have computers at home. Of those, many can not afford the $8.60 per month BEV access fees or a modem. In an information age where the gap between the information "haves" and "have-nots" is widening, MFRL has acted as a "safety net," to support the information needs of the "information have-nots."

The project acts as a unique test-bed for monitoring and evaluating patron usage of Internet resources, online reference services, VLIN (Virginia Library and Information Network), CAVALIR Online (a union database of Virginia Libraries), and other local

BEV resources. The project is assessing the demand for services, effectiveness as reference tool, and the new staffing demands in providing Internet access to the public. Most importantly, this project will serve as a model for both replication in other localities, and a prototype for other Virginia libraries.

Broad-Band Access

While other U.S. public libraries have provided their staff and patrons with varying degrees of Internet access, the Blacksburg Area Library is unique because of its **high speed connection** to the Internet, the use of **client/server architecture**, and the **number of applications** available through BEV. MFRL patrons are able to use several powerful Internet clients including Gopher, E-Mail, Telnet, and FTP. Beginning in October 1994, MFRL patrons will also be able to use the Windows versions of these applications as well as NCSA Mosaic and a USENET news reader.

Experience of Two Tiered Access

In addition to the broad-band NII access at the Blacksburg Area Branch, MFRL staff at the Christiansburg and Floyd libraries have dial-up NII access through the Virginia Library and Information Network (VLIN), a project of the Library of Virginia. Through the experience of both methods of access to the NII, MFRL has a unique perspective on the advantages and disadvantages of the alternate methods of access.

The obvious advantages to dial-up access include; the relatively low cost of modems, the availability of communications software, and the use of inexpensive phone lines for NII connectivity. It must be noted that dial-up access via VLIN is a local call for the Christiansburg staff and a toll free call for the Floyd staff. The expense of the toll free numbers is carried by the Library of Virginia. Combined, these advantages allow for rural Virginia libraries to access the NII at a relatively low cost.

The primary disadvantages of dial-up access relates to the limitations of bandwidth. The problem of 14.4K data speed is more than a issue of slower data transmission. Using dial-up NII access to a node on the Internet requires a separate line for each simultaneous user, thus limiting access by the library staff, and even more so, the public whose total usage demand far exceeds that of the library staff. MFRL attempted to use existing voice and fax phone lines for NII connectivity. Although cost effective, the fax and voice lines were tied up to the point where four additional lines had to be installed at one branch to meet MFRL staff NII access needs.

Dial-up access does not adequately support all the wealth of the NII. MOSAIC, FTP, WAIS, GOPHER, TELNET, USENET newsgroups are best used through client/server architecture, whereby the client software is loaded on the local computer enabling efficient distribution of processing with the remote server computers.

The benefits of broad-band connectivity as deployed at the Blacksburg Branch are clear. Patrons and staff can simultaneously use NII workstations on the Ethernet LAN.

Although currently only half of the 20 port Xyplex Hub/Router is being used, the T-1 dataline allows for enough bandwidth for all 20 ports to use intensive data applications simultaneously such as using MOSAIC to download graphics, hypermedia, or other multimedia. A 600Kb file that requires over 5.56 minutes to download with a 14.4K modem would be available over a T-1 line in a quick 3.1 seconds!

Another advantage to broad-band connectivity is the availability of client applications which distribute the processing of the data between the remote server computers and the local workstation. This empowers library staff and the public to fully utilize NII resources in all formats. Today, from their local public library patrons can visit thousands of remote libraries, museums, art galleries, government resources, corporate sites, small businesses and huge medical databases. The number of hyper-media capable World Wide Web (WWW) servers on the NII is growing faster than any other part of the NII. Without broad-band connectivity, these thousands of WWW hyper-media sites would be practically inaccessible.

The immediate disadvantage of broad-band connectivity is the ongoing cost of the high-speed dataline. MFRL has been fortunate to negotiate a relatively reasonable rate of $425 per month with Bell Atlantic. However, even this rate is a burden to the limited MFRL annual local budget of 1.1 million dollars as we plan toward providing NII access at all three MFRL sites. Furthermore, similar datalines for libraries in other parts of the country cost 30 times as much as the MFRL data line *for the same distance.*

The greatest barrier facing libraries, schools, and hospitals is the cost of broad-band connectivity and is the issue that needs to be addressed by Congress. (see *The Role of the Federal Government section* below)

Project Evaluation
A key goal of MFRL participation in the BEV project is to evaluate comprehensively the provision of free public access to the Internet in a public library. Project findings will be disseminated throughout the profession.

What has been learned?
The "Information Poor" public need NII connectivity to meet their information needs.

Once MFRL offered connectivity, people seized the opportunity. Focus groups and questionnaires reveal that 51% of NII users at the library use it for educational purposes. This confirms the vital role public libraries are playing in supporting the education needs of their communities.

Through offering public access to the NII, the library has:

1. Improved the efficiency of library services. The wealth of materials on the NII, most of which is not owned by the library, may be quickly downloaded off a remote server and utilized by a patron locally.

2. Achieved greater customer satisfaction. A patron survey revealed that 87% found MFRL NII services either very useful, or somewhat useful.

3. Brought in new library users. 69% of the MFRL NII users are new patrons.

4. Empowered citizens. One of the most common activities of patrons using e-mail is sending messages to President Clinton and Vice President Gore. Other local officials also are also regular e-mail recipients.

5. Created a "virtual community. Over twenty local electronic discussion groups have been created ranging from civic issues and computers to cars and home-brewing.

6. Enhanced economic development through patron education and electronic access to more than thirty local businesses which now offer services and information online. The library has helped create a more "computer literate" labor force through our ongoing workshops.

7. Created new avenues of communication for the citizens. During the first five months of the project MFRL recorded over 13,000 Internet sessions; of those over 5000 were e-mail sessions. The number of messages sent and received is many times that.

New Technology Requires Training

Just as library patrons require help finding materials in the stacks, they also need help navigating the Internet. Once MFRL had NII connectivity, a massive staff training effort was begun to transform the existing library staff into competent Internet guides or what are now being called "Cyberians." These Internet navigators help patrons find needed information no matter where in the world it is stored.

In providing NII access, the Blacksburg Area Library also offers **Internet training seminars** and **individual tutorials** for patrons. These services are provided throughout the week by trained electronic reference librarians free of charge to the public. Public libraries have proved to be the perfect location for educational support such as these NII public workshops.

To date, MFRL has held over 50 public workshops training over 500 people on NII usage. This training comes at a great expense. Approximately one-third of the MFRL 1993-94 project subgrant funds was designated for training: In 1994-95 this percentage rose to nearly 100% of subgrant funding. Thus, training library staff and the public will continue to be a fiscal challenge to libraries.

The Role of the Federal Government

The library profession is quickly changing to keep pace with technology. The library profession accepts the challenge of transforming library services from those of the past to those of the "virtual library." *Any information* that is available in electronic form can be quickly at the fingertips of library patrons regardless of where in the world the information is stored. Although this transformation is expensive, it is vital to the needs of the American public. Without substantial ongoing Federal support to assist in this conversion, public libraries risk becoming obsolete institutions.

The following immediate actions are recommended:

- LSCA is not finished. LSCA should be reauthorized with a focus on technology. House and Senate conferees should support the higher of the House or Senate passed levels for each library and educational technology program for LSCA funding of H.R. 4606.
- House conferees negotiating H.R. 4603 should maintain the 70M funding level passed by the House for NTIA Information Infrastructure grants.
- Libraries need ongoing fiscal means of providing broad-band NII access.
- Plan for, and fund point to point connectivity in libraries, schools, and hospitals; not, the less effective dial-up access.
- It is critical that Congress assist libraries in providing universal access to the NII, as specified in sections 103-4 of FCC legislation regarding Public Rights of Way and Access.

As future telecommunication legislation is drafted,

- include the preferential rate provisions of S. 1822 along ALA's recommendations in Council Document 21.13;
- incorporate the concepts of S. 2195;
- include a review of the impact of regulatory changes on public entities such as libraries;
- incorporate open data network standards into all NII legislation;
- promote the establishments of digital libraries with the ability to store images, audio, video, and other hyper-media data;
- send a strong message to state and local governments about the importance of their role in supporting public libraries in the information age.

Conclusion

Being in the 9th Congressional District, Blacksburg is fortunate to be served by a progressive, forward-thinking representative in the U.S. Congress, Rick Boucher. As a member of the House Subcommittee on Science, he has intelligently led the national debate on telecommunications issues, specifically on those relating to the National Information Infrastructure. His leadership and repeated public support for this project continues to be instrumental in furthering successful project deployment and electronic resources services to our patrons.

Project Acknowledgments

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- Special thanks to the late Rocco Santangelo for his BEV art work, Janet McNair for designing the BEV Environment

Appendix

What is the Blacksburg Electronic Village?

The Blacksburg Electronic Village (BEV) is a project to link an entire town in Southwestern Virginia with a 21st century telecommunications infrastructure which will bring a useful set of information services and interactive communications facilities into the daily activities of citizens and businesses. The project will encourage and nurture the development of applications and of delivery mechanisms for services designed for everyday life.

The BEV goal is to enhance the quality of people's lives by electronically linking the residents of the community to each other, to worldwide networks, and to information resources in new and creative ways. The entire Blacksburg community serves as a laboratory to develop a prototype "residential street plan" for the country-wide "data superhighway" conceived at the national level. The project is being conducted so its successful aspects can be replicated in future electronic villages in Virginia and elsewhere in the United States.

The Blacksburg prototype exemplifies four essential characteristics to a successful electronic village:

- including an entire community to achieve a "critical mass" of users,
- focusing on interactions between people rather than focusing on particular technologies,
- providing applications tailored for each type of user, and
- implementing the project on a timely basis, so that community networking becomes a fundamental consideration in the vision and planning of the nationwide networking infrastructure.

A unique feature of this project is to invest sufficiently in the project to achieve a critical mass of users of an information service suite, and then to tune these services to cost effectively meet the needs of people and businesses of Blacksburg. Once this is done, replications of the commercially proven parts of the project can be implemented in other locations. This aspect, which is central to the project planning, forms a vital link between the investment being made in Blacksburg and the future market successes in information technology by the companies participating in the Blacksburg Electronic Village. In essence, the Blacksburg Electronic Village offers companies interested in 21st century information services an opportunity to test new products and delivery mechanisms in a real-life community laboratory prior to large-scale introduction.

View of Blacksburg of the Future

The purpose of the Blacksburg Electronic Village, and its foreseeable result, is a town transformed: a wide range of electronic capabilities will be available and under routine use by its residents and commercial establishments. This transformation will not happen overnight, just as the availability of telephones and television sets did not transform the world overnight. But, a major transformation will occur over time, because of the empowerment of the individual that results from network access.

The catalysts for this transformation are the tools that the network provides. In the parlance of network engineering, these are:

- electronic mail,
- gopher servers,
- World Wide Web servers,
- bulletin boards (Usenet),
- electronic conferences (mailing lists),
- virtual terminal access, and
- switched video.

Each of these tools comes alive when brought to bear on the needs of the community:

- Electronic mail is an easy-to-use and inexpensive messaging system to the outside world for a person confined to home with an illness.

- Gopher can be used by a tenth grader as a source of current information about earthquakes around the world for a research paper on plate tectonics, perhaps utilizing a connection to a frequently- updated digital library system.

- Virtual terminal access becomes a lifesaving instrument in the hands of a doctor trying to quickly assess the side effects of a new drug to which a patient is having an adverse reaction; the doctor can rapidly access an electronic data base containing case histories of other patients' reactions to the drug, and receive suggestions for possible remedies to the situation.

- Switched video can be used by local schools to open up educational opportunities for students in schools where teachers for special and advanced topics are not available. With live two-way video between a classroom and another classroom in another school, students can attend classes without regard to geography.

Each tool is a chameleon that can be tuned to whatever application is most compelling for the user. The following is just a sampling of some of these applications; a major goal of the network is to make it easy for users to innovate and create their own uses, either by

themselves or with the help of network engineers. Past experience shows that a collection of avid users is far more creative than even the most visionary network planners.

Educational Uses

The community link to the developing the associated National Information Infrastructure (NII) can be a "Local Research and Education Network" (LREN). A LREN allows access to the information and communications facilities being developed for the NII, including access to data bases and computers, and increased access to other students, teachers, and researchers. Through LREN, students and teachers can communicate with their peers in other towns, other states, and other countries. Fifth graders can use an electronic conferencing facility to exchange ideas with students from other countries on strategies for preventing air and water pollution in each of the students' home neighborhoods. Students can observe as their science teacher contacts, via computer link, an expert on planetary science for details on the visit by a Venus space probe; The expert, who was recently interviewed on a network news show about the successful project, agrees to take questions from the students at their computers. Video can be joined with the capability to form computer data links with remote locations to provide an "Electronic Field Trip" capability that encourages active interest and participation by each of the students.

Local applications of networking abound that benefit students, teachers, and parents. A network "Course Server" can be set up to assist a teacher in obtaining and developing course materials for a new class that actively integrates reading and writing using computers. The Course Server can be used to distribute the course materials to students and to collect their homework and tests. Such a facility eases the burden on the teacher needing to offer self-paced instruction and progress monitoring for his or her students. Curriculum development can be supported by information exchange between colleagues and an "Ask an Expert" service provided by professionals in the community interested in enriching the academic lives of elementary, middle, and high school students.

Each type of student in the community can utilize the LREN: K-12, university students, even adults taking an occasional community college or university class. The network can be a powerful tool in the hands of the parents of the students as well as school administrators. In addition to the ones mentioned above, the following applications can be tailored to the specific groups that benefit from them:

- Instruction to and from the home can be conducted

- Network and software support can be provided to make it easy for students to create their own applications, and applications for others. For example, students can help an agency that provides food and shelter to needy people to categorize its records, allowing the agency to organize its activities more efficiently.

- Library services can be accessed, including those that help with finding how to locate the library materials.

- Programs for "exceptional" students are possible, including English for foreign students, directed efforts

- toward students with learning disabilities, and enrichment programs for advanced students.

- "Electronic Buddy System" facilities can be made available, including mentoring programs, for example between elementary students and university students.

- Progress monitoring and encouragement by parents is practical and time-efficient, with monthly, weekly, or as necessary daily reports on progress in particular problem areas, or for congratulations on the students' academic achievements. Information can flow from teachers to the parents or from parents to teachers, or both.

Business and professional uses

Businesses and professionals already have, to a large extent, made use of computers and network services. Information links to customers, clients, and the citizenry; however, generally have not been available. Much existing use of data networking that extends beyond the confines of an organization is hampered by the lack of a critical mass of users; also lacking are the applications for many different types of users found in a general population. The Blacksburg Electronic Village provides the means to change this situation for businesses and professionals in Blacksburg.

The medical area provides one of the most compelling areas for application, because use of the instant information transfer capabilities of a network can be used to directly save or improve lives. Electronic mail messages between patients and doctors can be the fastest and most cost-effective approach for initial and ongoing communications about illness, treatments, etc. With electronic mail, posing a simple question to a doctor no longer requires sitting in the waiting room for extended periods or reaching the doctor on the telephone at a possibly inconvenient time. Doctors can respond to patients individually, or can address a group collectively, as in a message to all pharmacists in town. Medical database searches, billing, electronic outpatient status monitoring, and medical image transfers are examples of some of the services that a network can support.

Retail product and service businesses, including restaurants, can use facilities similar to the home banking system for distributing information about products and services in the form of electronic menus or catalogs. A logical extension of this allows customer to order products and reserve services. In a university town, this can take the form of looking at a restaurant menu and ordering a pizza for that late-night study break. In another example.

a customer can make an appointment with a hair stylist after determining the times his or her favorite hair stylist is available.

Networks can be used in offices, factories, and plants in industrial companies and utilities for electronic mail, general purpose information transfer, including images, and remote operations monitoring. Professional service firms that provide legal, technical, financial, or marketing services, can make heavy use of electronic mail and database searching. Most importantly, the availability of the network can spawn cottage industries in Blacksburg that utilize "telecommuting." In this application, the network is used as a mechanism to gather talented people to work together on a project that may be performed for clients located in Northern Virginia, or even farther away, such as California. Similarly, expertise from distant locations can be utilized for projects of benefit to Blacksburg.

Civic uses

The Blacksburg Electronic Village can serve as the foundation of an ongoing "Electronic Town Hall" in which people can communicate with each other and with town leaders informally by electronic mail to facilitate civic service and community improvement projects. Electronic bulletin boards and electronic conferences can be constructed to inform citizens of current and future town events, town improvement plans, ideas for future activities, and to allow each citizen a voice in discussing the relative merits of particular ideas and approaches. A neighborhood leader who is faced with a problem can use the network to reserve a public meeting room using the Electronic Facilities Reservation service, and then use an "Electronic Telephone Tree" to instantly send notices of the meeting to the 100 neighborhood households. Other network uses might include registration services, a volunteer registry, and distribution of town minutes and other civic information without the delays and expense associated with printing and mailing.

Quality of life uses

Social/cultural/recreational, or "Quality of Life" network uses abound. This is probably one of the most active areas for creative development of applications by users. Many of the same facilities available for civic use can be tuned to applications in the quality of life area. It is highly likely that the use of Electronic Mail will become as ubiquitous as a phone call or receiving mail from the U.S. Postal Service. Situations that require getting in touch with an entire group quickly, such as the postponement of a play rehearsal or a team practice, can use the mailing list feature to distribute the message simultaneously. Electronic bulletin boards (Usenet) and electronic conferences (mailing lists) can be conducted on topics as diverse as student sports programs, gardening, and landscaping advice and suggestions. Racquetball courts and other sports facilities can be reserved efficiently through the network, as can "signups" for sports and other activities. As in the educational area, town and university library services can be available on the network, as well as local and long-distance database searches. Relationships can be fostered through,

"Electronic Socials," and "Electronic Pen Pals" can help, for example, facilitate contact between school children and nursing home residents.

Entertainment is likely to be a significant area of growth in data and video services. With the capabilities of incoming "Switched Video," residents can provide video programming choices not available otherwise with potential access, for example, to a large amount of foreign language programming from around the world. With the proper video delivery infrastructure in place, electronic movie previewing, rental, and delivery also is possible, as is the availability of interactive video services. The capabilities of outgoing "Switched Video" makes the fabled "videophone" dream a reality, allowing both person-to-person "video calls" and conference "video calls." Although the applications differ, they potentially can be provided on the same network infrastructure that also provides the educational, business and professional, and civic network services.

Mr. BOUCHER. Thank you very much, Ms. Dillon.

Dr. Staman.

Dr. STAMAN. Mr. Chairman, I would like to leave this group with one message today, and I want to talk beyond dial-up.

Mr. Boucher's invitation that I participate in today's hearing came during a time when we at CICNet have increasingly found ourselves engaged in a number of forums discussing rural America's access to the National Information Infrastructure. Thank you and the subcommittee for the opportunity to make these comments.

In discussing the purpose of this hearing with Ms. Bashkin, she indicated that you had initially posed the following question. If I live in a rural community 100 miles from the nearest large city, 100 miles from the nearest university, and therefore presumably 100 miles from the nearest Internet provider, what would it take to gain access to the Internet?

Inherent in that question are a number of critically important qualifiers, such as the quality of access, equal access for all, affordable access, and the primary focus of my comments today, access which seeks to resolve rather than exacerbate an evolving information haves and have-nots problem within our society, something you referenced in your opening comments.

So that my comments might be presented in the correct context, I need to begin with a description of my organization, CICNet, and CICNet's owners, the major research universities throughout the Midwestern portion of the United States. CICNet is owned by the following universities: Chicago, Illinois, Indiana, Iowa, Michigan, Michigan State, Minnesota Penn State, Purdue, Ohio State, Northwestern, and Wisconsin. There is more than football in the Big Ten universities in our Nation. In 1988 these universities founded CICNet, and today over 400 colleges, universities, and commercial organizations representing between 15 and 20 percent of the traffic on the NSFNET backbone use CICNet for at least part of their access to the Internet.

Several years ago CICNet was awarded $1.3 million by the National Science Foundation to conduct a project that we entitled "rural datafication." We are, in fact, the creators of the term "rural datafication," and we are rather proud of that. That seems to have created a fair amount of visibility throughout the Nation.

The intent of the project is to find ways to create Internet infrastructure and services in difficult-to-reach and difficult-to-serve user communities, and although we use the term "rural datafication" for its obvious marketing potential, inner cities and low socioeconomic areas also are part of the project. It was and is today the only project of its kind in the Nation, an eight-State project focused on strengthening the ability of State networks to deliver services to rural communities in ways which result in sustainable services following the conclusion of the project. The States currently involved in the project include Indiana, Iowa, Michigan, Minnesota, Illinois, New York, Pennsylvania, Wisconsin, and West Virginia.

During my initial preparations for today's hearing I learned that there are now at least 14 providers claiming a national Internet presence in the United States and in excess of 200 local providers presently serving over 100 area codes. The preceding clearly sug-

gest an evolving viable and robust marketplace at work, and we may well be on a path which will ultimately result in a resolution of the access questions that I outlined initially.

But the path is long, and the issues are becoming increasingly complex with each passing day. There are common themes which occur whenever we discuss the topic of access in rural America. They focus on the need for equitable and affordable access for all citizens, the need for proactive community, and economic development strategies—that is key: How does one create ownership within a community? —the creation of enhanced training and support services, and the development of improved information services. Key among these is the need to ensure that rural America participates fully in the services which will be made available by the NII. This last point is particularly critical and is not well understood either in rural America or here in Washington.

As the superhighway increases in capacity, steps must be taken to ensure that the same capacity is available throughout the land. Policies and practices which create high performance, robust infrastructure in urban areas or within selected segments of our Nation while simultaneously creating low speed, low performance infrastructure in the remainder will actually serve to exacerbate the information haves and have-nots problem that I referred to earlier in my comments.

Simply put, Mr. Chairman, we need to find solutions which scale to vast geographic regions of the United States and huge user populations. We need to do this in ways which transcend the evolution of market forces, and we need to provide a fabric of sufficient richness, robustness, and reliability so that kids can learn, teachers can teach, doctors can serve, and businesses can compete.

It is becoming clear, to me at least, that, marketing and public posturing to the contrary, depending only on market forces to deliver high quality supported information infrastructure and services to rural America, will result in both a long period of time for such services to become available and a further exacerbation of the problem. The worst thing that we can do is somehow wire them for dial access and then proceed to install fiber-based infrastructure only in locations where markets would normally justify such investments. We are not yet at a point where market forces will best serve the national agenda of equal access for all citizens.

The most important element of my testimony then is a recommendation that you focus on this issue as you think about access to Internet. The problem is more than pricing policy and significantly beyond the question of finding ways to provide an infrastructure where the equivalent of local telephone calls might be possible for all citizens. We have an opportunity to transform America in ways which parallel the transformations resulting from the Rural Electrification Act of 1936, but we need the same kind of vision, leadership, and initiative to create such a transformation. With your help and the right kinds of public/private partnerships that can be created, this transformation can be caused, and I would encourage you therefore to stay the course.

Thank you again for the opportunity to participate in this forum. I stand ready to provide additional information today and of course will respond to similar requests in the future.

[The prepared statement of Dr. Staman follows:]

U.S. House of Representatives
Committee on Science, Space and Technology
Subcommittee on Science
Washington, DC
Hearing on Internet Access
October 4, 1994

Testimony of:
Dr. E. Michael Staman, President
CICNet, Inc.
Ann Arbor, Michigan

Mister Chairman and members of the Subcommittee:

Your invitation to participate in today's hearing came during a time when we at CICNet have increasingly found ourselves engaged in a number of forums discussing rural America's access to the National Information Infrastructure (the NII). Thank you for the opportunity to discuss these issues in with you.

The growth of both the number of users and the applications of the Internet (that element of the NII which is available and working effectively today) has astounded even those of us who have been its most optimistic proponents for many years. It has grown from a resource used primarily by the research and education sector as recently as five years ago to a significant force within the nation's business sector today. It will become a major element of our global competitive posture within the decade.

Perhaps the best way to clarify its status at present is to quote directly from the July 7th, 1994 issue of USA TODAY:

> Across the USA, thousands of companies are tapping into the mother of all computer networks -- the Internet -- to find job candidates, communicate with customers, work out technical problems and peddle their wares. ... Having an Internet address is rapidly becoming a requirement for doing business, ..."

As with the deployment of all national infrastructures in the history of this nation, we need to insure that all citizens participate fully in both the evolution and the promise of this new resource. Its potential to transform the way we work, communicate with each other, and even enjoy portions of our leisure parallels the potential of virtually every other massive infrastructural change, whether it was the development of the railroads in the early 1800's, the electrification of urban areas in the late 1800's and rural areas in the mid-1930s, the

establishment of telecommunications connections in the late 1800s, or the development of urban and interstate transportation in the early to mid-1990s.

My comments today will focus on barriers to access to the NII that exist within rural America, and on several key initiatives needed to further encourage and enhance rural acceptance and use of the NII. For the record, I have submitted several additional documents which might be of interest to the committee. Specifically:

1. A paper discussing CICNet's Rural Datafication Project. This project has been funded by the National Science Foundation.

2. A report on CICNet's second annual conference on Rural Datafication. These conferences, the most recent of which involved approximately 350 people, literally from around the globe, has become one of the key forums at which people gather to discuss problems related to extending and using the National Information Infrastructure in rural America.

3. A working paper discussing several of the issues which we believe to be of critical importance as the nation continues its evolution to a National Information Infrastructure.

4. A document containing the full text of my report in response to your invitation to present testimony, from which my comments today will be drawn.

So that my comments might be presented in the correct context, I need to begin with a description of my organization, CICNet, and CICNet's owners, the major research universities throughout a portion of the midwestern United States.

The Committee on Institutional Cooperation

The "CIC" in CICNet stands for "the Committee on Institutional Cooperation," a thirty-five year-old collaboration among the following universities: the University of Chicago, the University of Illinois at Urbana-Champaign, the University of Illinois at Chicago, Indiana University, the University of Iowa, the University of Michigan, Michigan State University, the University of Minnesota, the Pennsylvania State University (the most recent member), Purdue University, the Ohio State University, Northwestern University, and the University of Wisconsin-Madison. There are over 75 separate and unique collaborations currently operating under the aegis of the CIC.

These institutions serve the region and the nation on a truly impressive scale. Collectively they account for more than 17% of the Ph.D.'s awarded annually, approximately 20% of all science and engineering Ph.D.'s, in excess of $2.5 billion in externally funded research annually, and over 17% of the holdings of the Association for Research Libraries. With an aggregate total in excess of 500,000 students, 33,000 faculty, and 57 million volumes within their libraries, these institutions are truly a resource which consistently enhances both the quality of life and the global competitiveness of both their region and the nation.

In 1988, CICNet was founded as a CIC not-for-profit corporation to provide inter-institutional CIC-university network infrastructure and network access to the National Science Foundation Network (NSFNET). Today, in addition to all of the CIC universities, both Argonne National Labs and Notre Dame University participate in CICNet Board of Director activities. As part of the CIC community of activities, CICNet is now part of the infrastructure providing NSFNET connectivity to over 400 colleges and universities, commercial or other organizations throughout its seven-state region of operations. A recent study indicated that approximately 20% of the traffic on the United States Internet backbone (NSFNET) came from throughout the CIC region. Given the above, and the rural community and economic development activities that are part of the mission of many of the CIC-universities, it should be of little surprise that these universities would encourage CICNet to move in directions designed to increase both NII access and services for rural areas.

Rural Datafication in America

Several years ago CICNet, in collaboration with NSF-sponsored networks in eight states ranging from New York to Iowa, was awarded $1.3 million by the National Science Foundation to conduct a project that we entitled "Rural Datafication." The intent of the project is to find ways to create Internet infrastructure and services in difficult-to-reach and difficult-to-serve user communities. It was, and is today, the only project of its kind in the nation -- focusing on strengthening the ability of state networks to deliver services to rural communities while simultaneously attempting to develop workable solutions which scale to vast geographic regions and huge user populations. The state networking organizations now participating with CICNet in rural datafication activities include INDnet (Indiana), IREN (Iowa), MICHNet (Michigan), MRnet (Minnesota), netILLINOIS (Illinois), NYSERNet (New York), PREPnet (Pennsylvania), WISCnet (Wisconsisn), and WVnet (West Virginia).

During the course of the project we have been in contact with citizens from throughout the nation, held several national and regional conferences focused on rural access and services to the NII, and participated in forums on the topic in Minnesota, Oregon, West Virginia, and Iowa. We have learned a great deal during this process. I would like to discuss four of the most important topics with you today.

I have entitled the first topic "common themes." There are common themes which occur whenever the topic of access in rural America is discussed. They focus on the need for equal and affordable access for all citizens, the need for pro-active community and economic development strategies based on telecommunications technologies, the creation of enhanced training and support for the large percentage of the population which has yet to understand the potential of an NII, the development of improved information services which both serve and stimulate communities as they contemplate the promise of the NII, and the need to insure that somehow rural America participates fully in the services which will be made available via the NII.

This last "theme" is particularly critical, and is not well understood either in rural America or in Washington. As the "superhighway" increases in capacity, steps must be taken to

insure that same capacity is available throughout the land. Polices or practices which create high performance, robust infrastructure in urban areas or within selected segments of our nation while simultaneously creating low-speed, low-performance infrastructure in the remainder will actually serve to exacerbate an existing problem of "information haves and have nots."

It is becoming clear that, marketing and public posturing to the contrary, depending only upon market forces to deliver high-quality, supported, information infrastructure and services to rural America will result in both a long period of time for such services to become available and a further exacerbation of the problem. The worst thing that we can do is "wire 'em for dial access" and proceed to install fiber-based infrastructure only in locations where market forces (read, return on investment) would normally justify such investments. We are not yet at a point where market forces will best serve our national agenda of equal access for all citizens.

The second topic that I would like to discuss with you is best described as "the uniqueness of unique-user communities." While somewhat obvious if one were to think about it for only a moment, this topic is of interest to rural America because there is little in our public policy which seems to recognize its existence and importance. Actual uses of the information and services which are available even today via the network turn out to be different for different communities. That is, like all infrastructure and all communities of users, the needs, goals, and uses to which the NII will be put by groups such as the native American community are vastly different from those of, say, the agricultural community, public libraries, k-12 education, youth groups, small businesses and the like.

Understanding these differences and developing strategies accordingly will accelerate the time when the promise of the NII becomes real for these communities. Such an effort will require the involvement of our universities, the communities involved, and the government. A critical element of any initiative in this area is the support and services that can be provided by the nations NSF-sponsored mid-level networks.

The third topic is "local ownership." Ownership of the problem by those most directly affected -- the nation's towns, communities, and their concomitant citizens' groups -- combined with the now rapidly evolving groups of "virtual communities" -- is critical to the success of the NII. There is probably not, nor should there be, sufficient discretionary revenues within the coffers of either our states or the federal government to meet the needs for the kinds of high-performance infrastructure that will ultimately be required by every city and town in America, and the absence of such infrastructure to the edge of any community will inhibit the development of appropriate infrastructure within.

By creating strategies which cause local ownership we will enhance local investment, creating a dynamic which will hasten the day when the NII is truly part of the fabric of the nation. There is little doubt that such local ownership will result in better and more appropriate solutions at the local level, and that solutions developed and funded locally will be more effectively used than something developed without local involvement or investment.

We should be careful not to confuse the messages of affordable access and suitable capacity in Topic #1, "common themes", and the "local ownership" theme of Topic # 3. To accelerate the evolution of an NII which extends not only to every city and town, but also to individual homes and businesses, we must BOTH insure that our telecommunications carriers deploy adequate infrastructure to support NII applications AND create strategies which cause communities, their citizens, and local businesses to experiment with and understand the power and potential of an NII. While seemingly a delicate balance, accomplishing both goals will accelerate the immediate uses of existing infrastructures and community interest in investing as new infrastructure becomes available.

The final topic involves "building on existing efforts." We should not forget or ignore the fact that there are already, and in some cases have been for many years, ongoing efforts at community development using whatever technologies are available. For instruction in the problems and successes related to these initiatives one need only contact individuals at places such as Eastern Oregon State College, which is attempting to serve citizens resident in some 42,000 square miles, West Virginia University, which contemplates training some 2000 teachers in the use of the Internet during the next three years, or Virginia Polytechnic and State University, which is using its "Blacksburg Electronic Village" project as an endeavor to bring the entire citizenry of a single town into the NII movement. At CICNet, a "Building Electronic Communities" project is attracting inquiries from around the world, and one can now find initiatives similar to those above in many pockets throughout the land. Their hallmarks are the involvement of volunteers, universities, usually some state or federal involvement, and sometimes (but, unfortunately with increasingly less frequency) mid-level networks.

We have examples and models upon which we can build, and whatever polices are developed should encourage and enhance initiatives such as those cited above.

Policy Implications

Both the NII goals of the current administration and NII services to rural America can be accelerated by several important policy initiatives. Initiatives are required which guarantee affordable access, stimulate the expansion of capacity at the local level, and create local leadership and ownership of this new and unique resource. In the process, market forces need to continue to evolve naturally while, simultaneously, initiatives are developed which stimulate enhanced volunteerism, the continued role of our universities, and the contributions of the not-for-profit mid-level computer networks. I have recommendations in three areas: pricing, infrastructure, and services.

Specifically, the following should be created:

1. An environment in which access will be affordable for all citizens. In the process of creating such an environment, avoid usage sensitive or time-based pricing. Citizens will, I believe, pay a fair price for volume (flat rate proportional to available capacity), but experimentation and innovation, two critical elements in creating an environment in which

we can realize the promise of the net, will experience a premature and tragic demise if discouraged by the burden of usage-sensitive pricing.

I would like to carefully place this recommendation in context. The NII will grow to encompass the cables coming into people's homes, and they will want to buy movies and other services across the NII. It is only reasonable that they pay the going rate for each of these services. But what is most critical is that the following three elements are maintained: flat-rate charging for basic access to all network services, such as those now on the Internet that are free; freedom from any bundled extra services included by the carrier in the price; and freedom to pick and choose services offered by vendors across the network, and to pay for them directly to the vendor, with no involvement by the carrier.

2. An infrastructural environment in which communities can and will assume ownership of their elements of an NII fabric. This is important because there are clearly insufficient financial resources to develop federally funded infrastructure to every city and town in America. Modest community and economic development programs which have as their foundation the same imagination and leadership shown by the National Science Foundation when it created the "Connections Program," however, will stimulate significantly community involvement and the investment required to make a full NII a reality. At the individual community level the initial investments necessary for proof-of-concept and demonstration activities are not large, and I believe that modest stimulation via federal programs will both create the initial investment and ownership, and larger local investments as local leadership and citizenry begin to realize both the promise and potential of the NII.

3. A services environment in which those organizations which choose to continue to foster and develop community and economic development can do so with renewed vigor and strength. Volunteerism, the role of not-for-profit organizations, the very special activities of organizations such as Eastern Oregon State College and the CIC universities, and the unique contributions that can continue to be provided by many of the nation's mid-level networks must be preserved if rural America is to realize the promise of a national information infrastructure.

Finally, and perhaps most important, we need to create an environment in which local communities can and will create services of their own. Services such as community information servers, structure providing access to health care information, activities to create virtual electronic communities of interest which encompass and then extend beyond local communities to a global environment, and initiatives which bring the digital library and other globally-based information resources to the desktops of individual citizens represent the promise of the National Information Infrastructure. We should never lose sight of these goals as we work very hard to make the NII a reality and a sustainable resource for the nation.

I believe that our government has an opportunity transform America is ways which parallel the transformations resulting from the Rural Electrification Act of 1936. I would like to close with a quote which I have used in other publications. It describes that impact much more eloquently than any which I could develop on my own.

> As late as 1935 ... decades after electric power had become a part of urban life, the wood range, the washtub, the sad iron and the dim kerosene lamp were still the way of life for almost 90 percent of the 30 million Americans who lived in the country-side. All across the United States, wrote a public-power advocate, "Every city 'white way' ends abruptly at the city limits. Beyond lies darkness." The lack of electric power, wrote the historian William E. Luechtenberg, had divided the United States into two nations: "the city dwellers and the country folks"; farmers, he wrote, "toiled in a nineteenth-century world: farm wives, who enviously eyed pictures in the Saturday Evening Post of city women with washing machines, refrigerators, and vacuum cleaners, performed their backbreaking chores like peasant women in a pre industrial age."
>
> ... from a description of the US before the Rural Electrification Act of 1936.
>
> (Robert A. Caro: The Years of Lyndon Johnson: Path to Power. Vintage Books, 1981, p. 516.)

Our opportunity and our responsibility are both clear. Thank you, again, for the opportunity to participate in this forum. I stand ready to provide additional information today and, of course, will respond to similar requests in the future.

E. Michael Staman

October 4, 1994

Mr. BOUCHER. Thank you very much, Dr. Staman.

Ms. Choltco-Devlin.

Ms. CHOLTCO-DEVLIN. Yes. Thank you, Mr. Chairman, Congressman Boehlert, and other committee members for the opportunity to testify before you today.

The more compelling witnesses would be the farmers, the mothers, the small business owners, the village and town board members, and the children who are the patrons of the Morrisville Public Library. It is with great honor that I bring their stories to you today.

In June 1994, the National Commission on Libraries and Information Science published its study, Public Libraries and the Internet. Among many other findings, one of great significance showed the large disparity between urban and rural libraries with regard to Internet connectivity. Of the 1,148 public libraries examined in this study, 79 of the urban libraries were connected while only 17 percent of rural libraries have Internet access. My testimony hopefully will make clear what can be accomplished if a small rural public library is given the same access and opportunities as its urban counterparts.

The Morrisville Public Library is a small rural library in central New York. The total operating budget is $20,000, including salaries for two people, the not insignificant heating bill, as Congressman Boehlert will attest to, utilities and materials including bills, books, periodicals, and other materials necessary to run library.

The library was in serious danger of closing its doors in July of 1992. The board of trustees chose to see it through, however, and the staff and volunteers wore extra sweaters through the winter, turned the lights on in rooms only when they were being used, turned off the hot water, and delivered overdue notices in person so that we could save on postage.

In March of 1993 Project GAIN came to my attention as the director. This was a study that proposed to connect six rural libraries to the Internet and was sponsored by NYSERNet, the Kaplan Foundation, and Apple Computer. The purpose was to see what impact on the community there might be if libraries were given everything they needed to be connected.

What happened in Morrisville was magic. I have hundreds of success stories and will highlight a few of them here. I had a young woman come into the library whose boyfriend had just been diagnosed with melanoma. He had never been a library in his life. She wanted to be an advocate for him, and we were able to locate information on the Internet about causes of melanoma, treatment, and other information. Two weeks after his surgery, this young man stepped foot into the library for the first time in his life.

I have an adult survivor of child abuse who subscribes to a use net group. She now has a support group which operates worldwide and is actually able to give support to other members throughout the world of that group.

I have an 83-year-old deaf man who was a ham radio operator and is no longer able to use his ham radio. He talks to other people via e-mail, other ham radio operators, through a Listserve.

I have a goat farmer who subscribes to a goat farming Listserve, and she is able to find information that will help her in her business.

A young teenage girl came and was able to get information on the Internet on anorexia and bulimia.

A young mother whose child died from sudden infant death syndrome found she was pregnant again and did not want the same thing to happen to her next child. She was able to come in and find information that helped her in her health so that she would not have to go through that trauma again.

A county judge came into the library as a last resort and wanted me to locate a newspaper article from 1870 because he was doing research on local history and was giving a presentation. I was able to find that newspaper article at the University of Virginia, and the newspaper article was faxed to me within a half-hour.

I have new business owners who come in and get census information to help them with the demographics for their business. I have many patrons who come in and look at the New York State job listing.

The story I like to tell the most though, however, is of great personal significance to me as well as to the library, and that is the story of Glenn, my literacy student. I had been tutoring Glenn when we got the connection three years and he had come to me not being able to read a single word. He had gotten through the ninth grade and, for some reason or another, never learned to read. I tutored him for three years, and it occurred to me that maybe it might help him if he learned to use a computer. So he began by word processing his stories on the computer, and then once we got our Internet connection it occurred to me, well, maybe he could write to other new learners across the world. So we posted a message to Publib, which is a discussion group on line for public libraries. Glenn wrote a message asking if there were other learners who would like to write to him. Well, they did. A lot of them did. He is now writing to people from Greece, from Brazil, from California, from Washington State, and he is also writing to a dairy farmer in Missouri who also likes to drive stock cars.

As a result of this project, we asked if there were any other Listserves on the Internet for literacy issues, and, as many of you know, there are quite a few discussion groups on a wide variety of topics, but there was not a single one on literacy, so Glenn and myself decided to start one under the sponsorship of NYSERNet. So we now conduct two worldwide Listserves out of the Morrisville Public Library for the discussion of literacy issues, and the other is for new learners to write to one another. We have set up pen pal contacts all over the world for people trying to learn English, people in the United States who have not learned to read or write and who now are using the Internet to develop their reading and writing skills.

I have people line up to use the connection in the library, but there are barriers, and it hasn't come without a struggle. As other witnesses have testified, telecommunications charges are a huge barrier. Our long distance charges were $200 to $300 a month because the connection was so well used. There are connection and equipment costs. The training and knowledge required in a library

to pull this thing off is not insignificant. And there are still the barrier of geographic isolation. People still need to come to our library to use the connection, and I have people constantly asking if they can have dial-up access into our library, and we can't afford to keep the connection on all the time.

So in conclusion, I would like to applaud the Government's visionary and philosophical commitment to equal access to the NII. I would like to ask for a fiscal commitment as well. Please don't let the magic in Morrisville disappear in a puff of smoke.

Thank you.

[The prepared statement of Ms. Choltco-Devlin follows:]

Testimony of
BEVERLY CHOLTCO-DEVLIN
Director and Project GAIN Site Coordinator
MORRISVILLE PUBLIC LIBRARY
Morrisville, NY 13408

for

U.S. HOUSE OF REPRESENTATIVES
Committee on Science, Space, and Technology
Subcommittee on Science

September 13, 1994

BACKGROUND

In September of 1992, the Morrisville Public Library in central New York State was in serious danger of closing its doors. The village of Morrisville and the surrounding communities of Eaton,West Eaton, Madison, and Peterboro, which the library serves, typify the rural environment of America in the 90's. The main industry in this area is dairy farming, with a significant proportion of the remaining population working in service and retail industries.

As a result of the fiscal straits experienced by the village and towns, and many like them across central New York (and indeed the country), the community, while sincerely funding the library to the best of its ability, was unable to keep pace with the rising costs of operations. As a consequence, hours were curtailed and the death knell reverberated in the not-too-far distance. To add to the burden, the previous director chose to retire. The library, through the sheer determination of its Board of Trustees, one-quarter time staff member and volunteers, struggled through the winter months of 1992 on reduced hours, with staff and volunteers wearing extra sweaters to keep warm, turning lights on only when a patron was using a particular room, shutting off the hot water, and delivering overdue notices in person to save postage.

In January of 1993, the Board hired me as the new director, and shortly after, word of Project GAIN (Global Access Information Network), a pilot project and study which would connect 5 rural libraries and one Native American School to the Internet sponsored by NYSERNet, Inc., The Kaplan Foundation, and Apple Computer, was brought to my attention. This project would provide all hardware and software necessary for connectivity, a year of full Internet access, access to 6 commercial online bibliographic databases, and a set stipend to cover telecommunications charges. The purpose of the project was to determine if a small rural library, without the financial resources to do so on their own, were given all the means to have access to the Internet, would there be a beneficial impact on the community. I jumped at the chance and applied for participation as a project site. Fortunately, we were selected to participate and in July of 1993 (a little over a year ago) our connection to the rest of the world began.

The story of the journey of our library's near-death experience to its burgeoning capacity for positively impacting the community (and, as you shall see, the world) can be directly traced to our participation in this project.

The findings of the study (McClure, 1993) have shown Project GAIN to be a remarkable success. The degree of positive impact that our participation in this project has had on our library, our community, and indeed the global community could not have been foreseen and is truly remarkable. Indeed the benefits are still unfolding on a daily basis. Following are a few of the many examples of impact:

- MAGIC IN MORRISVILLE

Literacy

A wondrous and miraculous thing has occurred as a direct result of the MorrisvilleLibrary's participation in Project GAIN. In addition to my role as director of the Morrisville Library, I have also been a Literacy Volunteer for 5 years. I received my training through a course offered by the library. My student, a 51 year old dairy farmer somehow managed to get through the 9th grade with less than a first grade reading level. When he first came to me he quite literally could not read a single sentence. We had been working together for a little while when I felt it might be a good idea to have Glenn do some of his homework on the computer. He began by writing simple stories only a few sentences long. While he still had quite a way to go to become a proficient reader, working on the computer seemed to increase his self-esteem.

One night in August of 1993, the serendipitous idea struck me that we should send out a request on PUBLIB (an online listserv or discussion group which provides a forum for communication and discussion of public library issues) in an effort to see if other librarians or tutors knew of other new adult learners who might want to correspond with Glenn. Glenn composed a short email message introducing himself and magic happened (See Attachment A). The response was overwhelming. We received many replies from new learners and also from others offering to be mentors. Glenn is currently writing to several new learners across the country. He now corresponds via email on a regular basis with a farmer in Missouri who is also learning to read and who coincidentally has a love of stock car racing as does Glenn. Glenn is also writing to a man from Brazil and a woman from Mexico who are learning English. He has become a type of mentor to students who have only just begun to read and has agreed to relinquish his anonymity to help others in his situation.

It is a well documented fact that learning best takes place when exercises and lessons have a real and meaningful goal. The benefits which Glenn has derived from using the Internet in his hard-fought quest for literacy are many-fold. As a new learner, Glenn is actually developing literacy skills in three areas: traditional

reading and writing literacy, computer literacy, and network literacy. He has gained a great deal of self-confidence and has progressed in his skills to such a remarkable degree since the introduction of the Internet into our lesson plans that he was recently able to travel by himself to Cupertino, California to make a presentation at a conference regarding community networks. This past spring he finally the courage to go into a store and pick out a birthday card by himself for his wife for the first time in their 30+ years of marriage.

A subsequent search for an electronic discussion group about Literacy issues surprisingly revealed that none existed. In an effort to fill a void that obviously needed filling I am now the moderator of two electronic discussion groups devoted to literacy (thanks to NYSERNet's generous offer to sponsor them). LEARNER is a group for new learners to write to one another to practice their developing skills, to establish keypal contacts, and most importantly to have the chance to talk with someone else in their same situation. In a rural environment where people are so isolated from one another, this capacity to communicate with other people who have made the brave decision to overcome their inability to read is critical.

LITERACY is a forum for the discussion of literacy issues in by anyone who is interested. In this forum, professionals, tutors, educators and students discuss a number of topics ranging from detrmining learning disabilties to the best literacy software to use in a given situation.

The remarkable results of Glenn's courageous posting that one evening in August show that not only is access critical for the benefit of the rural community but it also shows how we can contribute to the larger global community.

Reference

Because the Morrisville Public Library's resources are so limited (our total operating budget, including salaries for two people, the materials budget, and the not-inconsiderable heating bill, was $20,000 in 1993), an up-to-date reference collection is difficult to maintain. Our connection has become my reference tool of first choice. By simply logging on I have been able to assist patrons in finding information on a wide variety of topics. In many cases and after some training patrons are able to access the requested information themselves. A few examples of our many successes include:

--A patron and I were able to locate information by the FDA on the tools used in an atheroscopy and angioplasty, two procedures he was scheduled to undergo. The patron related to me that he felt much more informed about his condition and that he was able to talk to his physician in an intelligent and informed manner.

--A young teenage girl came in and asked for information regarding bulimia and anorexia. We were able to find several items for her.

--I was able to locate information regarding bacterial contamination of milk for an attorney working on a case for a local dairy farmer.

--I was requested by the village and town boards to look for grant possibilities which might be of benefit to our community and do periodic searches for the village and town boards on a variety of topics after attending the meetings.

--A county judge who, for several months, had unsuccessfully attempted to track down an elusive newspaper article from 1870 for a presentation he was doing came to our library as a last resort. (He had already tried two university libraries) Because of our our access to the online bibliographic databases I was able to locate what I thought might be the article he was looking for at 3 universities nationwide. With a mixture of trepidation and excitement I called the University of Virginia and asked them to fax me a copy of the article. My patron had the article in his hands within a day.

--An elderly patron was concerned about a mysterious condition affecting his lips. A search of research abstracts resulted in a series of studies showing that a particular medication the patron was using could cause photosensitivity resulting in inflammation of the lips. The patron was able to down oad the information, take it to his doctor and have his prescription changed.

--A middle school student needed up to date information regarding Mauritania. With assistance the student was able to download the latest information provided on this country in the CIA World Factbook.

--A business professor was able to locate information for one of his students regarding economic conditions in former Eastern Bloc countries via the Economic Bulletin Board.

--One of our patrons, a journalist who was injured in an automobile accident and has mobility difficulties, is able to send her reference questions necessary for her work to the library via email. I will conduct the search for her and return the information that she needs by email . She then submits her work to the paper electronically.

-- A patron seeking to start a wind-turbine business to provide dairy farmers with alternative energy sources, is able to read the electronic version of a wind energy periodical on a regular basis.

-- A woman came into the library in tears because she had just found out that her boyfriend was diagnosed with advanced melanoma. He was having surgery the following and was terrified of learning anything about the disease. The woman felt that she needed to be an advocate for him and wanted to learn as much as

she could about the disease and the latest treatment. We were able to locate many up-to-date documents about the different types and causes of melanoma, prevention techniques and the treatments currently available. She met me later in the week at the post office, gave me the cautiously optimistic news about how the surgery went and made it a point to tell me how important the information was that we had been able to get from the Internet.. Less than three weeks later this woman brought her boyfriend into library. It was the first time he had ever been in a library in his entire life.

-- A young mother whose child had died from Sudden Infant Death Syndrome found she was pregnant again and wanted information on sleep apnea.

We have had hundreds of other similar success stories over the past year because of our Internet connection. The other sites also have similar stories to share. I can say without hesitation that, if it were not for our Internet connection, it would have been extremely difficult if not impossible to provide any of this information for my patrons.

- Communication

Living in a rural community often inhibits or prevents communication and exchange of ideas with others because of physical and cultural isolation. Because our library offers direct patron access to the Internet, the people in our community have been able to communicate with others throughout the world on a variety of topics. Because communication is an interactive process, our community members have taken advantage of the access they have to both receive information and, as importantly, *provide* information to the larger global community. Because of our connection, members of our community can simultaneously experience and relate both their uniqueness and also the common experience shared by all human beings.

--Several patrons have subscribed to different "Listservs" (electronic mail discussion groups) and monitor them on a regular basis. Some of these include: GOATS (goat farmers), ROOTS-L (a genealogy), WHEELS (racing)

--One of our patrons, an adult survivor of child abuse, was able to find a usenet discussion group on this topic and now has an "electronic" support group.

--Another elderly man was an active ham radio operator but is now almost completely deaf. He is able to correspond with other ham operators by email.

--A local journalist has subscribed to a writers' listserv and contributes to it regularly.

--Children as young as age seven have developed written relationships with 'keypals" (electronic mail penpals).

--a local resident is able to correspond via email on a regular basis with his brother who is currently working in Denmark.

Our connection has helped to facilitate communication between myself and other librarians through participation in electronic mail and discussion groups (Listservs). This capability has assisted me in my professional development and has helped me to become a better librarian.

In fact our electronic connection facilitated the development of a cooperative grant proposal between our site and one of the other Project GAIN sites. The entire planning process took place electronically using email and fax capabilities provided with our connection.

· Cooperation

Our connection has helped to bring about a greater spirit of cooperation between different community groups and institutions.

--Our local school system does not have Internet access as of yet. We have helped the school by forwarding much information of an educational nature to them. For example, our students are participating in a pilot project to learn Japanese, and I was able to provide them with additional cultural information about Japan. I have done demonstrations for the Middle School (curriculum studies), and the High School Seniors for career day. I was able to show them the many Campus Wide Information Systems available online and scholarship and grant resources. Many students were also interested in the Job Listings which can be found online.

-- I also did a demonstration for the Rotary Club and was able to point them to many resources regarding business which are available.

--I do periodic searches for the Youth Commission, the Village and Town Boards the Rotary Club, and the Cooperative Extension.

· Community

Because of the increased visibility which the library has received as a result of our connection and the incredible amount of use which has taken place, discussion has taken place regarding the potential development of a Community Net. Our Project GAIN connection has acted as a catalyst and motivating force behind a new and revitalized "can-do" attitude in our community. The library is increasingly becoming an Information Resource Center. As a result of the many demonstrations for groups and training sessions, community organizations are asking to meet in the library. For example the Youth Commission met at the library this past week. One significant component of the meeting included developing an electronic newsletter which the young people in the community could put together. "Keypals" was a major component of the summer youth program with the older children helping the younger to compose email

messages. The Garden Club also chose to meet in the library this year. At the next meeting I will be giving a demonstration of the many Community Nets which have an electronic "greenhouse." Many have expressed an interest in setting up our own community network.

The development of a planning and beautification board for the community was organized at founding meetings held at the library. I have assisted them in locating information from the Internet regarding grants and the development of a master plan.

As previously noted, one of the most significant problems regarding rural access involves geographic isolation. The interest shown in our connection has been so incredible that I have had to put up a schedule sheet for people to use the connection as I often have patrons waiting in line.

The next natural step and one which patrons have been requesting is dial-in access to our connection. It is especially important that members of a community which is widely spread out geographically, especially those who are homebound or cannot get to the library itself (i.e., children, the disabled and the elderly)

- **Increase in Funding**

As a result of the library's revitalized position in the community, which was effected by our participation in Project GAIN, the library received a modest increase in funding from the Town of Eaton this year. Members of the Board came up to me personally after the meetings and expressed to me that they wished that it could have been even more. As the funding sources begin their budget process for the 1995 fiscal year, we have received assurances from board members that additional increases are being considered.

BARRIERS TO ACCESS

It is hoped that the previous testimony has unequivocally shown that there is a critical need and demand for electronic access to information in a rural setting. It is even more evident that people living in a rural environment are physically, culturally, and intellectually isolated from each other and the rest of the world. Project GAIN has shown that connectivity provides an excellent way to alleviate that isolation. Rural dwellers must be given the opportunity to participate fully in the Information Age.

The public library is *the* institution of choice to function as the "safety-net" for electronic access to information. The public library has traditionally been the one government-sponsored institution which has the potential to benefit each and every member of the community young or old, rich or poor. Connectivity to the information superhighway, via the Internet is the logical and natural extension of the library's role as the community center for information provision and independent education.

A reality check will show that the successes highlighted above have not come

effortlessly. The findings of the GAIN study show that there are definite barriers to access which must be addressed in order to ensure equal access of all people in the United States to the Information Superhighway.

Such barriers to access include:

- Telecommunications Issues

  Morrisville Library's participation in Project GAIN was much more successful than even I imagined (and I had quite high hopes for the project). Patrons came in to use our connection on a daily basis, either directly or through mediated access. Because our site was required to dial-in to a Point-of-Presence (POP) in Syracuse to make the connection and due to the amount of traffic we were generating, our library incurs long distance phone charges of at least $150 -$200 per month. This amount represents a substantial percentage of our operating budget and absorbing such expenditures into our operating cost would present significant problems.

- Training

  Proper and ongoing training is crucial to the success of a project like Project GAIN. One can be given the most expensive state-of-the art hardware, software and access, but unless one knows how to use the tools, the access is meaningless. Fortunately we had the benefit of training in a workshop format both at NYSERNet and through on-site visits. The most beneficial training took place via daily email contact with the support staff provided by NYSERNet.

  In addition, I chose to provide direct patron access to the Internet at the Morrisville Library. I firmly believe that public libraries must serve a two-fold function if they are serve as the "safety-net." Libraries must, of course, provide access to information either through direct or mediated means. I feel also that it a critical component of fulfilling the safety-net role involves education. This is especially crucial in our rural environment where many patron are so poor that they cannot afford computers in the home or courses at a college. To fulfill that role, we offer workshops, individual tutoring, and demonstrations to groups who are eager to learn more about the "information superhighway." Unless there is a commitment to such training both for staff and patrons, access will necessarily be limited.

- Time

  Our site is staffed on a part-time basis only by myself and my assistant. Learning to use the connection, training patrons in the use of the connection, and providing Internet based services to the Internet all have to be accomplished while maintaining the existing services. These requirements take time, and while

I feel the resulting benefits are more than worth the time put into the project, the issue must be addressed. The implementation of the connection was an add-on duty. At our site we did not discontinue any of our traditional services in order to implement our Internet connection. Time management, especially in a poor underfunded library, is of paramount importance However, the benefits to our library patrons and community which resulted from that time commitment have been incalculable.

- Hardware

Our grant provided Macintosh computers and because I was previously comfortable with the Macintosh the use of such a platform was not an issue for me personally. However, it was an issue for many of my patrons, my co-coordinator, and quite a few of the other sites. People who were only comfortable with IBM-compatible computers had to first learn a new operating system before they could do anything constructive with the Internet itself. I spent quite a bit of time giving lessons to patrons on using the Macintosh before we were ever able to log-on. The findings of the study and my own personal view s that one of two things must exist: there must be complete training in the platform chosen as the vehicle for access to the Internet or multiple platform access must be offered. Although I prefer the Macintosh platform for myself, I feel that in order to truly provide equal access effectively and efficiently, the latter scenario is the more reasonable and workable one.

In addition, more than just text is available via the network and my patrons are requesting access to that information. Images and graphics are commonly needed and fortunately for us we were given the software and hardware which allows us to fully access such resources. However, through my experience and speaking with many others who have access, this is not always the case. It is critical that libraries be provided with "user-friendly" equipment and software. On a specific note, it is also critical that the monitors be large enough or font-size have the capacity to be increased to accommodate the needs of our visually impaired patrons. The advent of multi-media/hypermedia client applications such as Mosaic also requires hardware which will support such applications

- Access to the Computer

Our connection has been so popular that I often have patrons waiting in line to use it. I have had to set up a schedule sheet for patron use and training sessions. Our hours of operation are still somewhat limited because of budget considerations and peak time for use is a reality. Often I must tell the patrons to come back later. Because I am often the only person on duty I conduct the training sessions on my day off so that we won't be interrupted.

- Complexity of the Internet

Because the Internet is so new in terms of public access and because resources are being added on a minute-by-minute basis, there is a great deal of complexity and lack of true organization in the electronic world. I am still often overwhelmed by the multi-layered maze like quality to the net. Navigating the resources without proper training can be "frustrating and intimidating" (McClure, p.29).

- Need for Full Text

When one is working with a resource as powerful and complex as the Internet, there is the danger of expecting it to be many things that it hasn't become yet (though there is definite movement in some of these directions). Many of my patrons expect that they will be able to download full-text information on any given source. was able to download the entire "Song of Hiawatha" for one of our older patrons who wanted to use it as part of a birthday present for her husband, but the unrealistic expectation is that I can do that for any work. Complex copyright and access issues must be addressed concerning full-text provision.

- Geographic Isolation

As previously noted geographic isolation is one of the most significant barriers to access of information in a rural environment. Our connection has significantly reduced the implications of that barrier, but it is only part of the story. Lack of an effective public transportation system often prevents community members from getting to the library itself. With increasing proliferation of computers in many homes, provision of remote access to our facility is a common request As *the* information resource center in our community, it would be a logical and effective step to have dial-in capability to our connection.

- Continuation of Connection

Project GAIN ended in June 1994. Fortunately I was able to obtain another grant which allowed us to continue our access for another year. However, unless other funding can be obtained all of the remarkable stories such at those previously testified to will abruptly cease. The good work will end. My patrons will be disenfranchised and will once again become part of the information have-nots. Our local funding sources are supporting us to the best of their ability but are realistically unable to maintain the connection to it full capacity. The reality is that in April of 1995 the our voice to the world will be silenced.

BREAKING DOWN THE BARRIERS

The rural community has much to offer the world. While many speak of access solely in terms of what can be downloaded or received I prefer to think of access as a more fluid dynamic process in which we can also give to the world . Without our connection my

literacy student might not be able to continue his encouragement to other new reader to continue their studies. The world might never learn that the Morrisville Library houses original documents and manuscripts regarding the abolitionist movement, Gerritt Smith, John Brown and the Civil War. An adult survivor of child abuse in another state might never benefit from the experience which my patron generously shares with the Usenet group.

While there can be no one solution to the many barriers to access there are many possibilities and requirements which can be effected if vision and a true sense of the necessity for equal access in the maintenance of a democratic society are to be realized. Some of these include:

·The telecommunication barriers in a rural setting must be dealt with. Some suggested solutions include:

--Points-of-Presence must be locally available.
--Exploration into the elimination of LATA's for network connections and educational use is one option. (Polly)
-- Reliable and cost effective connections must be in place (a minimum of 56kbps). (Polly)

· Recognition and utilization of the skills and commitment of professional information providers, i.e. librarians.

--Professional librarians are currently being trained in a variety of technological areas including bibliographic instruction, online database searching, network management,LAN and WAN development, managing technology change.
--As service professionals they are trained and strategically positioned to bridge the gap between technology and the user.
--The library professionals' expertise in the organization and classification of information should be brought to bear in bringing some order to the admittedly sometimes chaotic state of the Internet
--Given the multitude of skills which information professionals bring to the construction of the information superhighway, fair remuneration with regard to salaries must become a reality in order to encourage such professionals to continue their public service. For example, as the sole provider for my family of four I earn less than $12.000 a year as the director of the library. This is not an uncommon scenario for the rural librarian.

· Given the above testimony, recognition of the public library as the most logical place for providing public access and education regarding electronic connectivity.

· Facilitation of strong training programs. The most modern highway system in the world is useless if people don't know how to drive.

· Provisions for "user-friendly" on-site infrastructure including hardware and software

That same highway will sit idle if users don't have access to vehicles.

- A commitment by government to use of the super-highway by the local public sector. For example 20% bandwidth allotment for local programming

- Assistance in funding small pilot projects such as Project GAIN to ensure that rural areas and other disenfranchised communities are given full participation in the Information Age.

- Exploration of the development of community networks.

The federal government has made a forward-thinking and visionary philosophical commitment to equal access to the information highway. It is imperative that a fiscal commitment be made as well. It is hoped that this testimony has shown what a small poor library in the middle of dairy country can do if a positive attitude and the resources to try are in place. Please help give other communities the same opportunities. Such an investment can on y help in the realization of the full potential that each person in this country has to offer.

McClure, C.M. et al. *The Project GAIN Report.Connecting Rural Libraries to the Internet* Information Management Consultant Services, Inc., 1994.

Jean Armour Polly, NYSERNet, Inc.

ATTACHMENT A

Date: Fri, 17 Sep 93 00:12:54 -0400
Errors-To: pu blll@nysernet.ORG
Reply-To: publib@nysernet.ORG
Originator: publib@rysernet.org
Sender: publib@nysernet.ORG
Precedence: bulk
From: publll (Publib Poster)
To: Multiple recipients of list <publib@nysernet.ORG>
Subject: literacy-adult learner seeks discussion or LIST
X-Listprocessor-Version: 6.0a -- ListProcessor by Anastasios Kotsikonas
X-Comment: Public Library Discussion Group.

Sender: Morrisville1 <mville1@nysernet.ORG>

Hi. My name is Glenn. I am an adult learner through Literacy Volunteers. I have been with my tutor for 4 years. I am looking for someone who is also learning to read so we can communicate with each other.

I am 51 years old. I am a self-employed farmer. I am also a stock car fanatic and driver.

Sincerely, Glenn

NOTE: Glenn is accessing the Internet courtesy of the Morrisville Libray and Project GAIN, sponsored by NYSERNet, Apple computer, the Kaplan Foundation and OCLC (among others).

We were wondering if there was a LISTSERV or discussion group for new adult learners of reading to talk with one another over this remarkable resource. Often literacy students are isolated and (like many of us librarians) need someone to practice their skills with and bounce ideas off of. It also helps (as we know) to talk to someone who is in a similar situation as ourselves. If you know of any such Lists or discussion groups or know of an individual who would like to correspond with Glenn by email, please respond to us personally at the above address.

If no such LIST or group exists, we would be interested in finding out if there is enough interest to start one. Glenn and I would be interested in

doing so.

Thanks.,

Beverly Choltco-Devlin
Director, Morrisville Public Library
87 East Main Street
Morrisville, NY 13310

mville1@nysernet.org

Mr. BOUCHER. Thank you very much for that very thoughtful statement, and I would like to express our appreciation to each of the witnesses for sharing their views with us this morning. This has been extremely illuminating and helpful.

Dr. Heiman, let me begin my questions with you. I would appreciate it if you could talk a little bit about the need that a professional person such as yourself has for computer data networks generally. You get your services through an on-line provider, and you are connected to that on-line provider's information base. How important is that to you as a physician? And would there be a competitive disadvantage for physicians who have access at low cost without having to pay long distance phone charges, on the one hand, as compared to physicians who have to incur those costs, on the other? And if it is not a major problem and potentially creating competitive disadvantages today, could it in the future as the need for that kind of access increases?

Dr. HEIMAN. Currently for me it is not a competitive disadvantage.

As you know, it is very difficult to recruit physicians to work in rural environments. I think that access to a computer system improves the quality of life just like having a local art center or a Virginia Creeper Trail, in that it does attract people to our area, and in that sense there may be some competitive disadvantage.

I enclosed with my written testimony some testimony from Jackson White, who is an attorney in our town—

Mr. BOUCHER. And we are going to make that a part of our record.

Dr. HEIMAN. I appreciate that. And I think for Jack and others in that business it may be a competitive disadvantage, because he likes to link up with other attorneys for specialized information and use law networks, and I think his testimony does speak to that.

[The prepared statement of Mr. White follows:]

UNITED STATES HOUSE OF REPRESENTATIVES

Subcommittee on Science & Technology

Internet Access

September 13, 1994

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written submission by

Jackson S. White, Jr.

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eWorld • jwhite
Lexis Counsel Connect • jwhitexj

Personal Background

As the above indicates, I am a practicing attorney and an active computer user.

I was born and finished high school in our state capital, Richmond. Later, a degree from the University of Virginia School of Law and service on the editorial board of the *Virginia Law Review* gave me opportunities for practice both in large cities and large firms. My wife and I, though, chose to settle in the small Southwest Virginia town of Abingdon that is Congressman Boucher's home. We have enjoyed our 30 years here and raised three children who are now adults and successful in their chosen careers.

Before I was a lawyer, I was a newsman—first with the Associated Press and then in television and radio. With that background, when computers for law firms first appeared about 1970, I embraced them as the new-generation writing tool. By the late 1970's, our firm had established its first computer communications link to the Westlaw legal research database. By the mid-1980's, I had a personal computer on my desk and had subscribed to my first electronic mail service, Western Union's EasyLink. A long line of similar services followed, many of them named above, which I have used for electronic communications and as a major source of legal and business information.

Besides person-to-person messaging, I have been a regular participant in computer discussion forums that involve lawyers throughout the United States and in foreign countries. I also have communicated online with clients, family and friends.

Three times, the Virginia State Bar named me as chair of its Computers and the Law Committee. Today, my commuter and telecommunications activities are centered in the American Bar Association's Law Practice Management Section where I chair the Technology & Automation Interest Group and write extensively for its publications.

Finally, I have been a speaker for legal forums on computer and technology subjects, both in Virginia and Tennessee. In fact, I organized and was a speaker for the first statewide legal education program that was broadcast in Virginia via satellite.

Mainly, though, I am an active computer user and communicator. On a typical workday I may be online a half-dozen times with various computer services both from office and home, while communicating via modem from my home or a distant business venue to my office's computer network.

The Issue

Briefly stated, I advocate equal-cost access and fairness. *Let me explain:*

Most of today's online services connect to their users by what are known as packet networks. These are the common carriers of telecommunications. A "packet" of data will leave my computer and travel over telephone lines to the nearest station or "node" of the network. There, my packet enters the network with an electronic tag attached that says, in effect, "let me off at Westlaw [or CompuServe, AppleLink, etc.]." Millions of other data packets may be traveling at the same time on the network, tagged for thousands of sites. Some, in fact, may be headed for my computer, from my online service.

Users need convenient and economical access to the entranceways or nodes of their computer networks. These nodes are but local telephone numbers that answer to a modem which, in turn, connects to the network. Users, thus, need local, toll-free numbers with which to access their packet networks.

If you live in Washington, Pittsburgh, Dallas or San Diego—or any other major metropolitan area of the United States—a proliferation of these numbers is at your disposal. They will connect you to all the major networks, at all of today's modem speeds, ranging from the low 2400 baud still used by many individuals to the 9600-baud and higher speeds that are today's business standard.

By contrast, in the Abingdons of our nation, network nodes are nowhere to be found. I estimate that more than half of our geographic area (but a smaller percentage of our people) lacks local-number computer network access. As a result, we are required to

place long-distance phone calls to reach a network node, before paying the cost of the service and its network (the latter two typically bundled as a single charge). Meanwhile, our family, friends and business or professional associates in the nation's larger metro areas escape altogether these first-level costs—which are substantial.

A friend, Dr. Mel Heiman, will make the oral presentation to you on this subject. He has included in his written submission cost comparisons between services he uses and his telephone charges to reach their networks. Mine are similar. You will observe that we in rural and small-town America must spend two, three or four times as much money just to reach the access network as we pay for the services themselves, including their network access. For example, the very popular America Online service, based just across the Potomac, charges users $3.50 per hour including its access network. That is the total you in Washington will pay to use AOL. In Abingdon, though, we first must pay our long distance carrier nearly $14.00 per hour in daytime, about half that amount at night, to reach a network node—*before* we pay AOL's $3.50 hourly charge.

Internet access is provided by most of the electronic services named. Some offer full Internet service, others just e-mail. Collectively, they provide a major gateway to the Internet for the American people. While I have had less experience with the direct Internet access companies, I understand their communication policies are similar to those of the commercial vendors discussed. That is, people in major metro areas gain access with a local phone call; those in smaller communities must place a long distance call.

What are the implications of this two-tier cost structure?

As access to the Internet and commercial online services becomes more vital to life in America, persons in non-metro areas will be at increasing competitive disadvantages. As expected, these disadvantages will be felt most severely by the young and the poor. School children in the nation's Abingdons will be restricted in their use of online services by the steep long-distance access charges—while those in the Richmonds, Fairfaxes and Norfolks will enjoy a competitive advantage that is solely geography-based.

The same can be said for low-income adults, even small businesses. Those in the metro areas will have the real leg-up over their rural and small-town cousins.

What can and should be done about this disparity?

There is strong precedent for a leveling of this playing field. We did it with other services that, as a nation, we decided were vital. As a result, a 29-cent postal stamp will cause your letter to be delivered to a sheep ranch in Montana or an apartment in suburban St. Louis. Whether your address is RFD or urban, the electric and telephone companies in your area will charge same for their calls and kilowatts. We decided this—as a nation—years ago, because we considered these to be lifeline services.

I suggest that access to electronic communication and information services is fast becoming of the same imperative nature. No-longer can they be called frills; no geography-based access penalty, thus should exist. As a nation we must make sure of that.

Solutions

I have dwelled longer on the problem than I will on possible solutions. They have technical and economic components that I am not particularly qualified to address. Expressed most simply, though, we must spread the cost of providing access to all persons in this country evenly among all users—wherever they may live. We do the same with the Postal Service (and with UPS, FedEx, etc.). We do it with the power companies and phone companies. We can do it with our electronic networks and services.

One readily available means, now used by certain electronic vendors, is the toll-free 800 number. Two of my services provide them for the basic price. AT&T Mail (and its ABA/net subset) give 800-number access to all subscribers. Westlaw, however, uses packet networks for persons with local access, but has 800-numbers options for those outside the toll-free dialing areas.

There may be other more cost-effective means of providing universal toll-free access. The owners of the networks and online services will determine that when they face mandates to offer it. Without question, though, the means now used in non-metro areas —individual long-distance toll calls—is the *least* efficient way to provide such access.

In concept, I would prefer that what I have advocated occur without government mandate. Realistically, I do not see that it will happen, My experience as an advocate of this position on various committees and councils confirms that view. Most people live in urban areas where toll-free access now exits. The lower-priced services, especially, will never attempt equalization until they know that their competitors must do the same. Otherwise, they will stand to lose customers in the areas where access costs will rise (slightly) to cover the cost of providing equal access nationwide.

In summary, I urge that Congress decree equal access to the Internet as well as to the many important commercial electronic services. At the same time, I urge you to refrain from saying how such equalization will be accomplished. Let the involved businesses determine that. Just say that it must happen; they will decide how.

Thank you for allowing me to present these views to your subcommittee or a subject that is of great importance to many areas of our nation—including my own.

Sincerely,

Jackson S. White, Jr.

Dr. HEIMAN. I agree with some of the other panel members that this is just the surface of what the electronic superhighway can do for rural America, and I feel strongly that in the future it will be a definite competitive disadvantage for me not to be linked up.

I think having continuing education available in the more cost effective way than traveling, let's say, to Washington for a meeting is going to be important as we deal with managed care issues where physicians are going to have to run on a little tighter budget and hospitals are going to have to run on a tighter budget. So in terms of that, I think it would be a major impact.

For me right now, I have a lot of fun with it, with my child, my teenager, and I think it broadens my horizons, but I don't think it currently interferes with my competitive edge.

Mr. BOUCHER. Can you use the computer networks now in order to do medical research if you want to learn about what literature or other experiences are available concerning a specific problem? Do you find the computer network useful for that?

Dr. HEIMAN. Yes, very much so. In fact, I really appreciated the software from the University of Virginia. It is a fairly sophisticated program that saves a lot of time in terms of getting specific information. I can fine-tune it, connect to the national computer for maybe 12 seconds, and then actually get summaries of the articles that I need and then copies of the articles to follow.

Occasionally I serve as a professional witness in a malpractice case, let's say, and it allows me to get information from the Brazilian Journal of Orthopedics that certainly wouldn't be in our local library. So it does help me, yes.

Mr. BOUCHER. And I would assume that kind of use will become increasingly important over time.

Dr. HEIMAN. Yes, sir, I expect so.

Mr. BOUCHER. And that is where the competitive disadvantage may arise if we don't address this access disparity and cost disparity problem.

Dr. HEIMAN. Yes, sir, I agree.

Mr. BOUCHER. Well, thank you very much. That is very helpful to us.

Let me ask you one additional question, and that relates to the cost figures that I had in my opening statement. These were just averages that we had received. I would like to know if they are roughly consistent with your personal experience. We are suggesting that people can buy a connection, that they get an on-line connection for something like $20 a month and that the long-distance telephone charge is something like $15 per hour. Is that roughly consistent with your experience?

Dr. HEIMAN. Roughly. I have summarized in detail in my written testimony my experience, but as an example, Physicians On Line is a free service provided by drug companies and managed care groups, and it is $18 an hour to access that during the day, and that was the best I could do. The 800 numbers, I think the lowest figure I could find was $6 an hour, so they are not really free even though they are 800 numbers.

Mr. BOUCHER. Okay. Thank you very much.

Ms. Sass, let me ask you a couple of questions about the Sailor project. First of all, just to summarize your comments, this is a sys-

tem in which access nodes for the Internet are placed in all of the public libraries within the State of Maryland. Have you achieved that goal of having all libraries within the State now possessing access nodes?

Ms. SASS. We are in the process of installing the equipment and the nodes right now, and as of this point, as of September, there are six libraries connected and we envision that we will finish the installation by the spring of 1995.

Mr. BOUCHER. Most of libraries will be offering a service to residents in the area that would involve those people actually going to the library and using the library's computer at that site. Is that correct?

Ms. SASS. That is one option. Because part of what Sailor's philosophy—part of the philosophy includes leveling the playing field. We recognize that not everyone has a computer at home. People do have the option of dialing in from home or from work or from school if they have access in those locations. If they don't own a computer, then they can come into the library and they can access it that way.

Mr. BOUCHER. We are very much interested in the dial-up access issue, as this discussion suggests, and that really is the point of my question to you.

I understand that in Maryland today you have something less than 200 access lines connecting the nodes in your public libraries for the purpose of dial-up access, which would mean that 196, or whatever the number is—

Ms. SASS. A hundred and ninety-two.

Mr. BOUCHER. A hundred and ninety-two residents of the State of Maryland at any given moment could be utilizing dial-up access through the library's access nodes. That is not a very large number for a State, and my question is, do you have plans to expand that number of access lines? Is the ultimate goal of your project to make sure that virtually any resident of the State who has a personal computer and wants to obtain Internet access making a local phone call to your access node would have the ability to do that pretty much at any time he or she chooses?

Ms. SASS. I can answer that in two ways. There are plans to expand the network so that there will be increased access, and, in addition, those people who happen to have Internet access already can access it without the dial-in capability. What they are doing is called Telnet. They are connecting from their computer to the Sailor network without using that telephone line, and so they are using their Internet connection to come in without dialing in, if that makes sense, and so that does free up the lines for the dial-in users, but there is a plan to grow the network so that the access does increase.

Mr. BOUCHER. And you do have the goal then of assuring that every resident of the State of Maryland who has a personal computer and a modem could utilize the services you offer in order to get access to the Internet with a local phone call?

Ms. SASS. We would like to think so.

Mr. BOUCHER. Okay. But that is your plan?

Ms. SASS. That is the goal. I have someone here who is much more knowledgeable about telecommunications. Pat Wallace is the other side of Sailor, you might say.

Mr. BOUCHER. All right.

Pat, would you like to comment on that?

Ms. WALLACE. I would just add that in many of our local library systems the Sailor project gives 16 dial access lines at each site. Harford County in Maryland, for instance, chose to add some of their own local lines to our 16, thus increasing that dial access capability. At the Pratt Library in Baltimore we have added another 18 to the Sailor 16. So each public library system is kind of expanding the access on its own in addition to the LSA Federally-funded line. So it has been a wonderful catalyst project.

Mr. BOUCHER. Thank you for that.

I would point out that Maryland is somewhat unique in terms of its geography. It is a State that has a more urban concentration than most States, and for that reason the Maryland experience, while very useful within Maryland, may not be completely translatable to other States that have a more suburban and rural population that is at the present time denied low-cost access to the Internet.

But I find very interesting the experience that you have and particularly your goal of making sure that through the placement of nodes in all of the public libraries that every resident of the State eventually will have the ability, using just a local telephone call, to get access to the Internet. I think that is very compelling, and I would like to personally congratulate you for the strides you have made in that direction.

Ms. SASS. Thank you.

I would like to point out that you are right about the configuration of Maryland, but when you are in Garrett County, you are about as far away from anything as you can be, and the goal is to provide access for those folks as well.

Mr. BOUCHER. For those folks as well, exactly.

Ms. Dillon, let me get you to tell us how the Montgomery-Floyd Regional Library's experience differs from that of other libraries within the State that may be tackling this, and what successes have you had that others have not, and to what do you attribute those successes?

Ms. DILLON. I think our major success has really come from having some very unique talent that we grew within, you know, the library system, someone who understood the technology and could piggyback on the activity at the local level and kind of be forward thinking enough to understand how the library could work with that structure.

We are essentially working, as I said, with a dual connectivity through a slip connection there at the Blacksburg area branch that doesn't deal with availability of phone lines. Every computer there within the public service area is technically a node on the Internet, whereas over in Floyd County, which is as rural and as remote as you probably can get, they are having to compete for phone lines at the State Library over an 800 dial access system. They can't get the documents, they can't Telnet, they can't FTP, so in a sense they

are getting very disparate access compared to the people there in Blacksburg.

So this has required—you know, it is kind of a dual approach as far as training and managing. So since—that is why we are somewhat unique. But I think our uniqueness is the fact that we just forged ahead and took advantage of some very nice opportunities.

Mr. BOUCHER. You are connected, are you not, to the Blacksburg Electronic Village project?

Ms. DILLON. Yes.

Mr. BOUCHER. And that gives your library in Montgomery County a high-speed link to the Internet.

Ms. DILLON. Right.

Mr. BOUCHER. A higher-speed link perhaps than other libraries in the State would have.

Ms. DILLON. Very, very much so.

Mr. BOUCHER. And that does make you unique. That is a point of major difference.

Ms. DILLON. And as we are training people—for example, last week we did a presentation for all the library directors in the southwest Virginia area, and we demonstrated the Mosaic and the Windows interface and the capabilities, and these people are still having trouble understanding what a client server environment is. So I think we are helping to forge some understanding of the differences and how we need to move as a region and as a State.

Mr. BOUCHER. You have described the difficulties that the Floyd County Library—which is remote from Montgomery County, probably 15 or 20 miles away—is having in terms of its Internet access. Have you given any thought to your library in Montgomery County becoming something of a regional node or hub to which you can tie libraries in surrounding communities and provide a higher-speed and more efficient Internet access that way?

Ms. DILLON. Well, actually the nodes are already available at the academic sites at Virginia Tech and at Radford.

Mr. BOUCHER. I understand, but in Floyd County they are having this problem.

Ms. DILLON. What we plan to do in the next year is to automate the library if we can get the money that we need to put in the T-1 lines to connect with Floyd County from Montgomery County. That is going to be very expensive. That line alone is going to be maybe $800 a month, maybe $1,000 under current rates. That is the way we hope to connect, and, again, it is talking that Board of Supervisors into funding this.

I have been told that we must carefully relate whatever we do to the needs of the schools and the students and the educational process.

Mr. BOUCHER. Well, thank you very much, Ms. Dillon. I appreciate those responses.

I will have questions momentarily for our two other witnesses, but I would like to turn now to the ranking Republican member, Mr. Boehlert.

Mr. BOEHLERT. I would like to thank all of you for your expert and informative testimony.

I am interested, as you might suspect, in the magic of Morrisville. So tell me a little about how a small library with a budget

of $20,000 gets involved, what did it cost you, and where did you get the support? Tell me a little more about it.

Ms. CHOLTCO-DEVLIN. Project GAIN came to my attention through one of our board of trustee members who was also a student at Syracuse University School of Information Studies.

Mr. BOEHLERT. We have heard of Syracuse University. The chairman is from Virginia Tech territory.

Ms. CHOLTCO-DEVLIN. I know. I bring it up with trepidation.

The cost of the connection was—if you include the cost of the equipment, the stipend for the phone charges—we did get a small stipend to cover some telecommunications costs, the actual connection, and we did get access for half of the grant period to six commercial databases, including Medline which our patrons found most useful—was around $7,000, which is a significant portion of our budget, however.

Mr. BOEHLERT. About 25 percent.

Ms. CHOLTCO-DEVLIN. Almost half.

Mr. BOEHLERT. Yes, more than that. What is your budget?

Ms. CHOLTCO-DEVLIN. Twenty thousand.

Mr. BOEHLERT. Oh, twenty thousand. A third.

Ms. CHOLTCO-DEVLIN. The State of New York—we were able to maintain our connection because the grant period ended in June and I was able to obtain two grants to maintain the connection because the State of New York saw the importance of this. In my grant proposals I incorporated network connectivity with more traditional programs, and fortunately the library was able to retain their connection at least until September of 1995.

I firmly believe, however, that while the Government needs to provide seed money for start-up costs, this type of access needs to be seen as an operating experience of the library and needs to be incorporated into the operating budget, pulling in resources from local, State, and hopefully Federal funds.

Mr. BOEHLERT. But, you know, Ms. Sass pointed out the town 100 miles from Seattle in Washington State with a 20 percent unemployment rate made a decision, a tough decision obviously, and they prioritized, invested in a library. I would like to think that more communities would do that. I think, next to a church, the library is the most important thing in a community.

Ms. CHOLTCO-DEVLIN. That is right.

Mr. BOEHLERT. I mean you are all facing difficulty with your budgets, aren't you?

Ms. CHOLTCO-DEVLIN. Yes.

As a result of our connection and because of the galvanizing effect it has had on the community, the town has chosen to increase its support to the library.

Mr. BOEHLERT. What is your 1994 budget? Well, you are gone now. You just left the job a week ago. I understand that. But what is the 1994 budget?

Ms. CHOLTCO-DEVLIN. The 1994 budget, if you include the grant money, was $25,000.

Mr. BOEHLERT. Well, what about local input?

Ms. CHOLTCO-DEVLIN. Local input is now at the $19,000 level.

Mr. BOEHLERT. As opposed to?

Ms. CHOLTCO-DEVLIN. As opposed to $18,500.

Mr. BOEHLERT. Five hundred dollars from the magic of Morrisville?

Ms. CHOLTCO-DEVLIN. Right.

Mr. BOEHLERT. That is part of the problem, is getting the local support.

Ms. CHOLTCO-DEVLIN. Right, but we are in a poor community.

Mr. BOEHLERT. I understand. It is part of my district. I understand the problem full well, but dairy farming is hurting.

Ms. CHOLTCO-DEVLIN. Yes.

Mr. BOEHLERT. But then everybody looks to us to provide some help.

Ms. CHOLTCO-DEVLIN. Yes. I think the help from the Federal Government can come in the ways that have been illustrated here in terms of effecting telecommunication policy change.

Mr. BOEHLERT. Let me ask you this—to interrupt your question—what about the usage of the library? Have you seen a dramatic increase in the usage?

Ms. CHOLTCO-DEVLIN. Yes. Our circulation—the interesting thing is that it has had an effect on our other services also. Our circulation increased by 3,000; attendance at the library increased by 2,500.

Mr. BOEHLERT. So would you imagine your successor, going for next year's budget, will have an easier time getting a reasonable increase?

Ms. CHOLTCO-DEVLIN. I would hope so, yes, and I did make a conscious effort to attend the local funding agency's each budget hearing, to tell what kind of impact that this connection was having on the community, and we have received assurances from the town that the increase next budget year will be fairly substantial.

Mr. BOEHLERT. What would it cost for dial-up access?

Ms. CHOLTCO-DEVLIN. Dial-up access would be $2,300, if you don't includes the telephone charges.

Mr. BOEHLERT. What is the $2,300 for?

Ms. CHOLTCO-DEVLIN. It is a yearly flat rate for the slip connection which requires us to dial into a point of presence in Syracuse or Utica.

Mr. BOEHLERT. So that $2,300 charge—then what, in addition to that? That would give you?

Ms. CHOLTCO-DEVLIN. The long-distance phone charges. We are charged the same as if we were making a long-distance phone call.

Mr. BOEHLERT. That is the problem.

Tell me, Doctor, about "Lonesome Doc." It sounds like we should make a TV documentary out of it.

Dr. HEIMAN. It is a great name, isn't it?

Mr. BOEHLERT. Put the mike on, if you will.

Dr. HEIMAN. Basically what happens is, I can get a list of articles from the National Library of Medicine, or actually there are several other libraries I can access through that program, and I download a summary of what the article has to say to make sure it is going to be pertinent to what I want, and then I can simply note through this "Lonesome Doc" software program, which is not on line all the time, exactly what I'd like. Then I push a button and I make the connection by phone through the modem, and it takes five seconds for the library to download that. Then within two days—actually,

I can get it faxed the next day if I am willing to pay an extra price. It is $6 an article routinely through the mail, which is usually plenty of time for me.

Mr. BOEHLERT. Now I've got one that is troubling me. I mean we have to face it. With the increasing popularity with the program in general, who should determine priority in getting access?

Dr. Staman, do you have any observation about that?

Dr. STAMAN. I think the only way to begin to really attack this problem—and it relates really to the kind of questions both of you have been asking—is to create a sense of ownership at the local community level. I don't think it is an issue of priority. There is not enough money in the coffers of the Federal Government to build the infrastructure that this Nation is going to need to truly have a rich National Information Infrastructure fabric. So we need to create programs, proof of concept projects, demonstration projects, so that we can find John Day, Oregon, a town of 400 people. I think the only connection to the outside world that is sustainable is the satellite link.

I was in Oregon last week, and somebody told me that in John Day, Oregon, it is not even clear you can keep a telephone line up long enough to transmit a fax out to the people in that town.

But if we can create programs where, because of an Internet connection, there's three jobs in John Day, Oregon, next year that weren't here this year, every town in America will begin to try to understand how to bring this infrastructure to the doorstep. So it has to be a public-private partnership.

You are right, you can't—you can't go to the Federal Government for the dollars, and I think trying to establish some sort of a prioritization system or a rationing system would stifle innovation, stifle creativity, and that is the hallmark of this technology today. People are beginning to experiment at length on it, and it is that that is creating the innovation and the economic development that needs to happen for this ownership to occur.

Mr. BOEHLERT. All right. Just to follow through, Morrisville is a relatively urban center compared to John Day, Oregon. How do you get—is it John Day, Oregon?

Dr. STAMAN. The name of the town is John Day, Oregon. It just so happened that for some reason that became the example for a meeting I was at yesterday—or last week. "How do you get Internet access to John Day, Oregon?" they kept saying. I don't know. It is lower southeast Oregon.

Mr. BOEHLERT. Four hundred population?

Dr. STAMAN. Four hundred people, yes.

Part of the problem is that there are—with the existing band width that goes into most of these towns, when we start talking about dial-up, you really can't do the kinds of things that are exciting many on the Internet today. It is hard to do graphics, visualization, medical imagines across the dial-up connection, not really practical.

There is a project in Iowa. It is a rural telemedicine project at Iowa State or at the University of Iowa. This project envisions initially moving medical information across the Net, ultimately imagines across the Net, and finally remote diagnostics that the high band width applications approximate.

If you can get to a point—I don't know the answer as to how to get from where we are today to where we need to be. If I knew that, I would go into business and do it myself. But if you can get to a point where the example of jobs that I gave you a few minutes ago or somebody at some medical facility in some small town discovers the power of having this technology there, the local citizens will begin to buy into it.

We are not talking hundreds of millions or millions of dollars to make this thing happen, we are talking about increased cost, but it has economic value, and the economic value is such that we find, for example, with citizens investing in higher and higher speed links into the home because it has economic value, that is beginning to happen. So the economic value is there; we just have to demonstrate it.

Mr. BOEHLERT. All right. Let me ask the other panelists, anyone who might want to respond, on this access and priority and who determines. Does anyone have any thoughts on that?

I mean we are going to get, I think fairly soon, to the point where there's going to be many more demands on the system than the system as it exists at that time will be able to accommodate. So who is going to determine access, the priority to access?

Doctor?

Dr. HEIMAN. I think the private sector is selling the major computer networks extremely well. I think they are doing—

Mr. BOEHLERT. Talking about instant communications. Excuse me.

Dr. HEIMAN. They are doing well nationwide, and I think more and more people are recognizing the value of these commercial systems which are profitable.

I have two concerns, one which I shared. The rural subscriber does not have that advantage, and I think everyone should have equal access, and I'm not sure the mechanism to provide that, but I would have to feel that technologically it is going to be feasible to do that economically to the point where these areas can pay their own way and not have the Government have to support them forever, maybe just to start things out.

My other concern arises in my dialogue with the State Corporation Commission and others that are more knowledgeable of this than I am, that some of these networks such as Internet—and all I have been talking about has nothing to do with Internet—that Internet is maybe being used for purposes it should not be used for, and that may interfere with the way it functions.

So I would see a role for somebody who has a global perspective of some kind to say here are the kind of things that Internet really is useful for and let's try to limit access and divert people with other needs to these commercial networks perhaps, you know, where they can handle the volume and it doesn't interfere with some of these other purposes.

I think each network has its own—in my experience, its own unique advantages and disadvantages, and I think the consumer can find pretty quickly in the commercial networks which ones are the best value and provide the best service for them.

What discourages me a little bit in the magazines that I read about access to the Internet, it is touted perhaps as something that

maybe it really isn't to the individual consumer, and maybe some education or someone who could sit back and say, "hey, you know, if you want medical information why not try this commercial program, you know, that doesn't necessarily use Internet?" I'm not sure I need to send e-mail about our health care problems in Germany. I mean someone in the United States would probably be very adequate for my means.

Mr. BOEHLERT. Any other comments?

Ms. SASS. Well, my concern about prioritizing is that first I think we have to level the playing field, and I think that those people in rural communities deserve to have the same opportunity.

Dr. Heiman raises some interesting issues. I think what he is talking about is content, and I see the Internet as simply the pipe. People have been using various kinds of on-line systems for 20 years. They are now using the Internet to deliver the content, and—you know, I don't have an answer for how it should be organized, but I think that what we are talking about here is a content issue, and it may be also an issue of semantics because I see Internet as, you know, it is this wonderful—it was an anarchy that was created essentially by the research community to allow people to communicate with one another and trade information. We are simply taking a look at it and figuring out how we can make it meaningful to our own communities, and I think we need not to lose sight of that. I think really the issue is, before we get into who should control it, let's first get everybody on it.

Mr. BOEHLERT. Thank you very much.

Thank you, Mr. Chairman.

Mr. BOUCHER. Thank you very much, Mr. Boehlert.

I would like to ask Dr. Staman a couple of questions about his rural datafication project which I find to be fascinating. First of all, I think it is worth noting again that the National Science Foundation has contributed $1.3 million to this project and therefore has acknowledged at least through that preliminary grant the benefit of extending access to the Internet to people in rural and suburban areas as well as in urban America at essentially the same cost. And that is a very important principle and one that I am glad to see the NSF acknowledging through the award of that grant.

Tell me a little bit, if you would, about the way that your rural datafication project is structured. What is your goal, and how are you putting in place a mechanism to get to it?

Dr. STAMAN. The initial goal was to find scalable solutions, solutions which worked in the vast geographic regions that I was talking about serving huge user populations, ways to find scalable solutions to extend the Internet to rural America or to difficult-to-reach and difficult-to-serve communities.

We structured a project in cooperation with a series of State networks. There is a State network in Indiana and one in Illinois, one in Minnesota, et cetera, and that was sort of an interesting process in its own right. I think it is the first time in the history of the Nation, and maybe the only time, that nine networking organizations cooperated on anything, and the idea basically was that you would use the State networks to extend physical infrastructure, deploying wires and routers in locations so that citizens could make local telephone calls.

We were able to find—to fund infrastructure in 19 locations throughout this region, and that is probably 3 percent of the population. So it is not a solution to the problem but a demonstration project.

We moved $100,000 into each of the States to deploy infrastructure, and that was a process that was scaled at the local level. It is not something you can do from Ann Arbor, Michigan, where I am located.

Centrally then, we did documentation, development of technology standards, development of training materials, et cetera, because that does scale to larger regions. You can develop training centrally and move it throughout.

Here's what we discovered. This whole Internet issue is really a vertical problem—what I will call a vertical problem and a horizontal problem. The process of deploying infrastructure and developing training materials, fundamental training materials, and fundamental technology standards turns out to be the same for every community that you want to serve, but the minute that you begin to talk about content you discover that American Indians use the network differently than K-12, than librarians, than doctors, and you have to do different things for different user communities.

So where we are in the process is beyond the initial deployment of infrastructure, trying to figure out how to begin to solve the vertical communities that I am talking about, and that appears to be something that doesn't scale quite so well because of the cultural differences or the usage differences of these various communities.

Mr. BOUCHER. Let me ask you this question. Very simply, what is it that you are spending the NSF money to do? Are you attempting to get access nodes located within local telephone calls or rural populations? Is that the goal?

Dr. STAMAN. We are attempting to do two things. In 19 locations throughout the Midwest there are now access locations where there are local telephone calls for those citizens. About half of those are in; the other half will go in the second year of the project. It is a two-year project.

The second and actually more important piece of this is to develop the documentation and the training and the end user support so that, in fact, there is effective use of the technology. So the NSF dollars are being used both for the deployment of infrastructure and the development of documentation and training materials.

Mr. BOUCHER. Do you think that the experience you are having now could serve as a useful model for the deployment of access nodes in local calling areas throughout the country? And the second part to that, do you think the National Science Foundation should adopt an expanded program that attempts to reach that goal?

Dr. STAMAN. Let me answer the second one first. I don't think that the National Science Foundation should be in the business of wiring rural America, and so from the perspective of that being a solution to the—to one of the problems you are trying to address, the answer is no. On the other hand—

Mr. BOUCHER. Well, let's pursue that with you for a moment. I mean I suppose what is inherent in the question is not a suggestion that the NSF actually deploy wires. We are talking about access nodes, router computers, terminals, and the like. That is a dif-

ferent question, and it is the absence of those today in many rural and suburban areas that necessitates those residents having to use long-distance telephone calls in order to get Internet access. That is the problem we are addressing. That is what we are trying to learn about and determine what possible solutions may exist for it. And do you see the NSF as having a role in doing that, or would you extend your general statement about the NSF not being involved in buying equipment to saying that the NSF should also not fund the acquisition of these access terminals?

Dr. STAMAN. To answer the first part of your question, in Oregon, for example, I am getting the same questions that I got two or three years ago throughout my region: What does it take to extend Internet to rural Oregon?

The National Science Foundation can help by helping us provide three or four or five or 10 locations in Oregon where we can demonstrate the power of the technology, begin to get citizens trained in using the technology and understanding what it is all about, and presumably in the process build models where they will invest themselves in expanded technology and in deploying the technology further throughout the region.

So I see the Foundation as providing seed money for projects, and our work is certainly one way to begin to do that, and the number of telephone calls that we are getting suggest that the National Science Foundation will start receiving proposals for rural datafication from other States throughout the Nation.

Part and parcel, you can't be in the business of building the whole thing, you have to get local support to do it, but you can be in the business of finding ways to get citizens interested in owning this technology.

Mr. BOUCHER. Let me ask this question then, and I would invite comments from other panel members as well. What about the potential for a system of freenets set up in rural areas where, for whatever reason, commercial service providers have not chosen to locate access nodes? The freenets today are nonprofit organizations that provide Internet connectivity; they get charitable donations. I suppose users can group together and help to finance the equipment necessary to supply them. Is there a potential that freenets could help to solve this problem? And if they couldn't do it just through the local contributions they might get alone, is there a potential that the NSF could contribute to that effort and help to facilitate the establishment of freenet access? Who would like to try that?

Ms. DILLON. I think I would.

On Friday—I understand that the Roanoke Valley is thinking about a free net, maybe based on the Blacksburg Electronic Village model. I perceive, what little I know about this—and I think this may relate to what we are talking about here—there is maybe a vacuum of understanding about what the technology can do, what is out there, how to proceed.

It seems to me from sort of a Statewide perspective, there is a real need for organization, coordination, and planning. A lot of this has sort of happened at will, very sporadically. I think the free nets could be one way of spreading access and beginning the initial foundation.

It seems to me that it is going to come down to the private sector and competition. I really do. I think they can forge ahead much faster than those of us in government. It is going to take me a while, you know, to talk groups into things and to really develop that understanding of what this all can do. For example, a physician can access and get these documents over the Internet from, you know, a public library. He doesn't have to pay for it. I mean there are so many vehicles. It is just an understanding of the vehicle. And also there is a great need to understand—well, to know what content is out there, and that is difficult, and it comes back to training and education.

Mr. BOUCHER. Thank you very much.

Would anyone else care to comment on that?

Yes, Ms. Sass.

Ms. SASS. I would just like to add that I know of one model, again in Washington State, in the northeast quadrant, where they are setting up a free net. The terms "education" and "training" have been very important there, but it is a way that they are exploring that local access. And they are doing it by partnering with the local university which is about 60 miles away, and it is actually being coordinated through the university. And they all attended the Conference of Rural Datafication last spring to get some help and assistance with setting it up, and what is, I think, interesting about the model is that the local economic development council is also involved. And they are providing information and training sessions to community groups to increase their awareness, because part of the issue in rural communities is, people don't really understand the need for access to information and they often see it as just a library issue and not as a greater community need.

Mr. BOUCHER. All right.

Yes, Dr. Staman.

Dr. STAMAN. I'm sorry. If we could accomplish one thing, we should take the term "free net" out of our vocabulary. Nothing is free. The model that you proposed began with a series of examples to find funding for these free nets, and by calling them free nets and offering free services we set expectations which are unrealistic. Charge a buck, but don't call them free nets.

Mr. BOUCHER. Okay. Well that's very helpful.

Let me just ask you about it because my knowledge of free nets is really quite limited, as perhaps the question suggested. Is there, in fact, no charge whatever for the users of freenets? Is there no on-line service charge?

Dr. STAMAN. Initially my understanding of free nets is that they began with that model. A group of people got together, they began to deploy the network. I would bet you that if you went around the Nation today and began to analyze what is happening to free nets, they would—you would discover that they are beginning to try to find out how to build economic models to—

Mr. BOUCHER. To cover their costs.

Dr. STAMAN. To sustain their effort. But it is good work, and partnerships between people who want to build public networks, build community information servers and access points in communities, partnerships between those kinds of people in the National Science Foundation is a good model.

Mr. BOUCHER. Okay. Thank you very much.

Yes, Ms. Choltco-Devlin.

Ms. CHOLTCO-DEVLIN. I just want to add, in my understanding of many of the models for community nets, the ideal situation is where the user can dial in from home or some other access point to the community net, and in a rural community you are still confronted with long-distance charges in a LATA, which is the local access. It is a long-distance call from my house to the next house which is an eighth of a mile away, and I'm not kidding. I use my porch lights to signal the person when we want to talk because it is a long-distance call, and in some rural communities those LATA's are very small, the area defined by them. So the telecommunication issue for users is another area where there is an inequity of cost.

Mr. BOUCHER. Thank you.

We have been joined by the gentleman from Wisconsin, Mr. Barca.

Mr. Barca, would you care to ask questions of this panel?

Mr. BARCA. Thank you, Mr. Chairman. I apologize for being late. I had another committee meeting that I just came from, so I hope I'm not covering—I was trying to get caught up with the staff here to make sure I wouldn't be covering ground that you have already covered.

I guess the one question I have which related to what had been discussed was just the issue of access to the rural area and the cost aspect of having that access, and I guess you did touch upon this. But the question would be that, if we were going to provide—require connections to rural areas for free or reduced charges, obviously you would have to make up the difference somehow through some sort of universal service fund, and have you touched on that to any great degree yet? And I guess, does anybody have any creative ideas as to how you would approach that?

Dr. STAMAN. I was afraid somebody was going to ask that, because we don't. The reality is that, when I think about this, all the options seem like bad options. Regulation seems like a bad option, a tax seems like a bad option. Waiting for the marketplace to go to John Day, Oregon, is waiting for Godot. Godot may never come. But at the same time, how do you get access to the citizens of John Day, Oregon?

The reason that I created the model of local ownership in an attempt to get local investment is because that is the only way that I can see in developing something which is scalable, affordable, sustainable, and yet acceptable throughout the community.

Mr. BARCA. Any other thoughts from any other panel members?

Dr. HEIMAN. We did touch a little on that earlier. I'm from a rural community, I'm a physician, and I disagree. I think the private sector will respond as long as they can make money doing it, and there are two basic approaches I see. One is to spread the additional expense to the people in the city who pay normal membership fees every month. I indicated I pay higher malpractice rates because of city experiences. Why not let the city people pay a little extra for CompuServe and let everybody have equal access?

Another approach might be through a different type of technology which I am not well versed in, but there are a number of

different access phone numbers for different networks. If they all shared one contact node somehow, a supernode, so to speak, perhaps there would be enough subscribers to make it financially reasonable. It might require Federal subsidy for research to develop that or sharing some kind of technology that might be hidden in a military file somewhere, but I think that kind of approach with perhaps a guarantee to whatever industry was approaching that, "We won't let you lose too much money, we'll make sure you break even if you try this venture," might be a way of solving it.

Thank you.

Ms. DILLON. I think, and what I have read lately about the set-aside fund, et cetera, we need some incentive just to get things moving, I think, at a faster pace. If that does require, you know, the 5 percent capacity set aside, make that, you know, a priority and then let's see what happens. I think the marketplace will take care of us. It is just going to take a little while to get the involvement we need and really demonstrate the value of what we have access to right now.

Mr. BARCA. I think Mr. Dillon touched on that, you know, that probably with time the hope is that the marketplace will make sure that you have that level of access.

In the interim basis though, do you feel that there is any concern that there might only be, let's say, one access provider and then costs might be artificially high for a period in time until competition comes in? And, if so, how can we ensure that costs are reasonable under that sort of a scenario?

Ms. DILLON. Well, as I said earlier, Bell Atlantic has been very, very helpful to us. Essentially we have an amount that has been negotiated for a monthly charge and they keep deferring billing us, which again is kind of getting us going, and we of course will help publicize their involvement. We have a very nice relationship with them. At some point though, reality will kick in, we will have to start paying, but in a sense that is what is happening right now. We are getting preferential treatment.

But I think Dr. Staman is very correct, we have got to sell this to the local level and make it their responsibility to fund and also provide that equity of access, and I think the library and the nonprofits are very important in this initial role.

Dr. STAMAN. It is my guess that in every city in this Nation there are three folks in a garage some place that envision themself becoming the next Bill Gates. The competition, especially for dial-up services, is just incredible, and the models that are out there are just incredible. And, yes, I believe that there will be isolated instances where there is a single provider and that provider is going to charge whatever that provider can get, and that is the way things are.

It is also my observation that very quickly competition comes in. If there is a market there and people are paying for it and they are paying these exorbitant high rates, then clearly there is a market there for somebody to come in and undercut. And it is not like it was in the thirties where you needed the kind of capital that was needed to deploy an electrical grid. We are not talking about impossible sums of money to set up a node to begin to provide these local

services, and so it is very possible to do it and very possible to do it very quickly.

Mr. BARCA. Thank you very much.

Mr. BOUCHER. Thank you very much, Mr. Barca, and I would like to express the subcommittee's appreciation to this panel of witnesses. You have, at great length, this morning provided excellent information and advice to us. We appreciate your taking the time to do that, and as we continue to consider this important question we may have some follow-up inquiries of you which we will submit by mail or by telephone, and we will appreciate your help if that happens, and so, with the subcommittee's thanks, this panel is excused.

We turn now to our second panel of witnesses: Mr. George Clapp, General Manager of the Ameritech Company's Advanced Data Services; Mr. William Schrader, President and Chief Executive Officer of Performance Systems International, from Herndon, Virginia; Mr. Edward D. Young, III, Vice President for Regulatory Affairs and Associate General Counsel for the Bell Atlantic Corporation; Mr. Jim Williams, Executive Director of the Federation of American Research Networks, Incorporated, from Ann Arbor, Michigan; and Mr. Mark Walsh of Interactive Services Association from Silver Spring, Maryland.

Without objection, we will make a part of the record the prepared written statement of each of these witnesses, and we would welcome your oral summaries; and, Mr. Young, we would be pleased to begin with you, sir.

STATEMENTS OF EDWARD D. YOUNG, III, VICE PRESIDENT, FEDERAL REGULATORY AND ASSOCIATE GENERAL COUNSEL, BELL ATLANTIC CORPORATION, ARLINGTON, VIRGINIA; GEORGE H. CLAPP, GENERAL MANAGER, BUSINESS DEVELOPMENT, AMERITECH ADVANCED DATA SERVICES, HOFFMAN ESTATES, ILLINOIS; WILLIAM L. SCHRADER, PRESIDENT AND CEO, PERFORMANCE SYSTEMS INTERNATIONAL, INC., HERNDON, VIRGINIA; JIM WILLIAMS, EXECUTIVE DIRECTOR, FEDERATION OF AMERICAN RESEARCH NETWORK, INC., ANN ARBOR, MICHIGAN; AND MARK WALSH, CHAIRMAN, INTERACTIVE SERVICES ASSOCIATION, SILVER SPRING, MARYLAND

Mr. YOUNG. Thank you, Mr. Chairman. It is a pleasure to appear before this subcommittee to talk about Bell Atlantic's vision of our role in the Internet. You are to be commended for your initiative and foresight, particularly for your steadfast commitment to do all that you can do to ensure that the information revolution benefits all Americans.

Like this Subcommittee, Bell Atlantic is looking at the Internet from many perspectives. We are providing solutions for schools, businesses, and residential consumers throughout our region. Let me begin by briefly describing our Internet initiatives in the schools. We have worked for years with higher education and research, the people who, by and large, have developed the underpinnings of much of today's Internet. Through our active involvement in the gigabit test beds of the National Research and Education Network to networks like PREPNet, Bell Atlantic has

supported the development of networks to serve the Internet community.

In West Virginia we are working with the State Government in a rural school program to interconnect all public schools in the Mountain State. In Union City, New Jersey, as Congressman Boehlert has mentioned, Bell Atlantic is working with the school board and the city on a project to integrate computer and e-mail technologies into the Union City community; 150 multimedia computers were purchased for home use by the parents of students at the Christopher Columbus Middle School, and 60 PC's were given to teachers for use in their homes, classrooms, and offices. The preliminary results show that student performance, attendance, and parental participation are all significantly higher.

Finally, Mr. Chairman, there is the Electronic Village in Blacksburg, Virginia, in your congressional district. In concert with the bright and energetic community surrounding Virginia Tech, Bell Atlantic is learning about customer preferences, user demand, and the costs associated with providing Internet services.

Beyond these programs, however, there is a need to ensure that all classrooms get access to Internet. Today most classrooms lack the requisite wiring and communications equipment. That is why five major education groups have joined Bell Atlantic in petitioning the Federal Communications Commission to modify its price cap regulations. Under our proposal, the FCC would create a special credit bank dedicated to the investment of millions of dollars in classroom wiring and equipment.

Let's talk about solutions for businesses. Many have said that the Internet will be an essential part of doing business in the information age. The networking that the Internet provides will enable agile competitors to collaborate with suppliers and manufacturers to do things faster, better, and cheaper. These collaborations will require the high-speed transport of text, video, data, and audio. For this reason, Bell Atlantic is widely deploying integrated services digital networks through ISDN. ISDN technology gives the customer the ability to make a high-speed connection to the Internet and make a conference call all over the same phone line.

In addition to using special ISDN telephone sets, ISDN boards for personal computers are becoming available at prices competitive with those of high-speed modems. Also through Bell Atlantic's ISDN Anywhere service, even residential customers will have access to ISDN. ISDN pricing by local companies has been quite attractive, with rates for home use in the $30 range and user rates ranging from a couple of cents to about a nickel per minute.

Providing universal Internet access to residential consumers will take more time, however. Most residential customers do not have the personal computers or modems needed to access the Internet. According to a recent Times-Mirror survey, only 12 percent of households have a modem-equipped computer and just 6 percent of Americans, roughly 11 million people, regularly go on line.

Even after a customer gets a PC, another factor may hinder his or her ability to access the Internet, the cost of reaching an Internet provider. As you have noted, Mr. Chairman, the toll charges to reach an Internet provider in rural areas can be quite high since rural customers cannot make a local call. Bell Atlantic

and others are working to solve this problem. In fact, we would like to offer more than just Internet access to our business and residential customers. We are currently examining business plans to offer end-to-end Internet services. One challenge for us as we plan our full Internet offering is the legal restriction that prohibits us from providing long-distance services. Our unregulated competitors can offer end-to-end service by leasing long-distance facilities from any carrier they choose and for a package price. By contrast, Bell Atlantic and the other MFJ-restricted companies are prohibited from offering such end-to-end solutions by ourselves. The result is, we must incur extra costs that cut into potential profitability of any Internet service we might offer.

Also as we examine the opportunities to offer this full Internet service, we have found that the capital costs associated with the hardware such as the routers, the network servers you mentioned earlier, are not even the most expensive elements, the cost of labor is a most critical cost.

Because the Internet is comprised of many different types of computers, gateways, and networks, many have noted that the Internet is unreliable, difficult to use, not understood by the vast majority of end users, and expensive to maintain. To meet this need, Bell Atlantic is considering using people as on-line guides to help customers use this system. Also, people are needed to monitor the network, maintain, and update the software.

While our numbers are presently only rough sketches, the early indication is that several million dollars will be required to offer the kind of performance and commitment to service that our customers have come to expect from Bell Atlantic.

In sum, Mr. Chairman, our goal is to serve our customers. We share the vision of an open Internet that makes it easy for anyone, regardless of size, to create, maintain, and enhance new information services. This is truly a democratic can vision. Cyberspace has the potential to unleash the creative forces of anyone regardless of income, education, or location, and the Internet is a platform where customers can send and receive information anywhere, any time. This is consistent with our goal of providing services to customers when, where, and how they want it.

I thank this Subcommittee for this opportunity to testify today, and I'm available to answer any questions you might have.

[The prepared statement of Mr. Young follows:]

Prepared Statement of Edward D. Young, III
Vice President Federal Regulatory and Associate General Counsel
Bell Atlantic Corporation

Before the U.S. House of Representatives Subcommittee on Science
of the
Committee on Science, Space, and Technology
October 4, 1994

Mr. Chairman, it is a pleasure to appear before this subcommittee to outline Bell Atlantic's vision of our role in the Internet. You are to be commended for your initiative and foresight, particularly for your steadfast commitment to do all that you can to ensure that the information revolution benefits all Americans, and that the gap between those who have access to information and those who do not must be eliminated.

The roots of the phenomenal growth of the Internet can in part be traced to the pioneering work of the House Science Committee. The Internet Society now estimates there are over 20 million users of the Internet.

Like this subcommittee, Bell Atlantic is looking at the Internet from several perspectives. We are working to provide solutions for schools, businesses, and homes throughout our region. Let me begin with our initiatives for Internet access by schools.

Solutions for education.

The power of the Internet to have a positive impact on students is well documented. We have worked for years with higher education and research -- the people who by and large have developed the underpinnings of much of today's Internet. Through our active involvement in the Gigabit Testbeds of the National Research and Education Network to mid-level networks like PREPnet, Bell Atlantic has demonstrated commitment to the Internet community.

In West Virginia, we are working with the state government in a "World School" program to interconnect all public schools in the Mountain State to the Internet and to each other using the high-speed data service called frame relay. Another example is Union City, New Jersey, where the public school population is 95% Hispanic. Many of the adults either do not speak English or it is their second language. The city is among the most densely populated in the U.S.

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Bell Atlantic, working with the school board and the city, has a project to integrate computer and e-mail technologies into the community. One-hundred-fifty multimedia computers were purchased for use by the parents of eighth graders at the Christopher Columbus Middle School for use at home. Over 60 PCs, also multimedia-capable, were given to teachers for use in their homes, classrooms, and school administration offices.

These PCs are all networked using Lotus Notes, a powerful software package that facilitates collaborative work. Importantly, all teachers and administrators were carefully trained in use of the PCs, especially for e-mail and database access. Weekend sessions were hosted by the teachers who in turn trained the parents. Internet connections were established -- including links to other countries -- and the school developed bulletin boards, on-line home and class schedules, and homework help lines.

We have just completed the first year, and as you would expect we have learned a great deal from the Union City project. To help us evaluate our progress, the Center for Children and Technology in a subsidiary of the Educational Development Center in Cambridge, Massachusetts is preparing an outside assessment. Initial indications are that writing skills have improved dramatically, parent-teacher-student communication is much better, and there has even been a decline in truancy.

This month, the school will put its own video server on-line and will develop an on-demand electronic curriculum. We are excited by this next step and are encouraged by the positive results at Union City so far.

And finally, Mr. Chairman, I wish to highlight the Electronic Village in Blacksburg, Virginia, in your congressional district. In concert with the bright and energetic community surrounding Virginia Tech, Bell Atlantic is learning about customer preferences, user demand, and cost parameters for Internet services.

Beyond these programs, there is a need to ensure that all classrooms get access to the Internet. Today most classrooms lack the requisite wiring and communications equipment.

That's why five major education groups have joined Bell Atlantic in petitioning the Federal Communications Commission to modify its price-caps access-charge regulations. Under this proposal, the FCC would create a special 'credit bank' dedicated to the investment of

millions of dollars in classroom wiring and equipment, replacing a current scheme that results in disincentives to investment.

Bell Atlantic is supporting the Internet community in other ways, too. We have worked with a public broadcasting station in the Tidewater area to provide facilities for Freenet-type services, including Internet access.

Solutions for the home.

The Internet is exploding not just in the number of users but also in the tools available to take advantage of the network of networks. Many observers believe that powerful new software will make the Internet more accessible to the public-at-large, particularly from their homes.

Of the new tools that are sparking special interest, the most prominent is the navigation software called Mosaic. Mosaic makes the Internet much easier to use by simplifying and expediting complex searches of the volumes of data of the Net. Several companies are readying "shrink-wrapped" Mosaic software, many with an eye toward the residential user.

Mosaic helps you locate the real gems of the Internet, things like detailed weather maps and complex graphics. But these rewards can be costly. Even with a relatively fast modem, the home user can lose patience waiting for a large data file to download. It's like trying to drain a swimming pool with a garden hose -- you can do it, but it takes time.

What customers appear to be demanding is "bigger pipes" that can carry more information to and from their homes. For this reason, Bell Atlantic believes conditions are favorable for widespread acceptance of Integrated Services Digital Networks. I will admit, Mr. Chairman, that if we had a nickel for every time we've heard the word "digital" this year, we could fund the NII. But it is important not to get lost in buzzwords and tech-talk and lose sight of the real purpose of new technology.

Technology reaches its potential only when real solutions take shape -- when people know what it can do *for* them. Take telecommuting, for instance. Telecommuting is catching fire as more businesses and employees see mutual benefits from a part-time or full-time work-at-a-distance arrangement that is often the best solution to the constant juggling act of work, family, and community. ISDN is an excellent technology for telecommuters, for

example giving them the ability to log-onto office computers from home even as they join a conference call with co-workers -- all over the phone line that already runs to their house.

The Internet is also a natural for ISDN, and demand is evident. Add-in ISDN boards for PCs are coming to market at prices competitive to high-speed modems. What's more, the trend in ISDN pricing by local companies has been quite attractive, with base rates for home use in the $30-$50 range, and usage rates ranging from a couple of cents to about a nickel-per-minute.

The changing federal role.

When discussing the Internet, the notion of cost has only recently moved front-and-center. As the Administration has made clear, it is up to the private sector to build the NII. In its formative years the Internet grew primarily through federal support, since the institutions that essentially created the Internet -- federal laboratories and higher education in particular -- are not profit-making groups.

Today, however, the Internet is rapidly becoming self-supporting, and Bell Atlantic supports this shift away from federal underwriting on a broad scale. While there may continue to be cases that call for federal assistance, Bell Atlantic believes that the commercialization of the Internet will yield tremendous benefits to the general public rather than to a selected, subsidized few.

In effect, the Internet is a living laboratory, and our sense is that it will flourish best in a climate that permits entrepreneurs, students, and large businesses to meet customer demands for products and services.

Business challenges.

Presently Bell Atlantic does not offer Internet services directly to our customers, but we have been considering doing so. As we have surveyed the existing Internet environment, it is clear that the legal restriction that prohibits us from providing interLATA services puts companies like ours at a considerable disadvantage.

Our customers repeatedly tell us that they want "one-stop shopping," but under current restrictions any Internet service we offer will require us to hand-off traffic that crosses so-called local access and transport area (LATA) boundaries. Our unregulated competitors

can offer end-to-end service by leasing interLATA -- that is, long distance -- facilities from any carrier *they* choose, and for a package price.

By contrast, Bell Atlantic and other MFJ-restricted companies are prohibited from offering such end-to-end solutions by ourselves. The result is that these extra steps cut into the potential profitability of any Internet service we might offer.

The LATA is for Bell Atlantic and other local companies an artificial barrier that drives up costs. Regardless of the nature of the service that might be offered, it is clear that it will cost more if we must deploy redundant equipment in all 19 LATAs in our region, even if we might more efficiently offer the service region-wide with centrally-located equipment and manpower.

Again, Bell Atlantic does not offer an Internet service today, and we have yet to construct a complete business case for such. In order to be responsive to the subcommittee's request for information, however, permit me to offer what we think are reasonable estimates for making functional Internet services available throughout our region.

Our hypothetical situation is to provide a solid core of Internet services, including e-mail, file transfer protocol, and access to world wide web, to just under 1,200 customers. Of the roughly 1,200, any 78 may be on the system at a given time. Users would have the option of analog dial-in, digital access using ISDN, or access from an office local area network, so this configuration would be suitable for residential and business customers in any area. The cost estimates are shown on Attachment A, and I hasten to reiterate that these are, at best, what we think are good guesses.

The important point is this: in order to justify deploying a service, there must be a clear indication that demand is sufficient. In our hypothetical scenario, the 1,170 customers are a sort of threshold of demand. Again, this number applies only to our hypothetical situation. But in virtually all our services and products, the first customers are by far the most expensive to accommodate. Only after a company exceeds the threshold -- which varies depending on market competition, anticipated demand, and so on -- do we find a logical business opportunity.

It might be of interest to the subcommittee to note that the capital costs associated with the hardware -- the routers, terminal servers, and so on -- are *not* the most expensive

elements. What Bell Atlantic is finding is that people-power is the most critical cost, particularly if services such as "help-lines" are established. An expense such as network software looks to be a big-ticket item, as it requires frequent monitoring, maintenance, and updating. Extrapolating from our hypothetical scenario, it is easy to see that costs to us could run to several millions of dollars in a very short time.

Of course there's the field of dreams notion -- that 'if you build it they will come.' The trouble is pinning down just what *it* is. Nevertheless we intend to keep exploring ways to meet the needs of our customers -- large and small, urban and rural -- with services that build on our heritage.

What Bell Atlantic can bring to the Internet.

Reliability, security, and integrity are hallmarks of our telecommunications network. As we explore Internet opportunities, we will set the same high standard for Internet services. As with any new environment, there are thorny issues -- such as access to adult material, or issues of the accuracy of information found on the Internet -- that will present new challenges to us.

Still, we believe that Bell Atlantic can help companies *and* individuals to achieve their potential on the Internet. Through an open network platform, the budding entrepreneur -- perhaps a bright young woman with an exciting new information service or a particularly compelling video game -- might offer that through a Bell Atlantic network, such as our video dialtone network that will at last offer competition with cable television companies.

We share the vision of an Internet that makes it easy for anyone, regardless of size, to create, maintain, and enhance new information services. This is truly a 'small d' democratic vision: new services will certainly spring from media giants like Disney, but cyberspace also has the potential to unleash the creative force of virtually everyone, regardless of ethnicity, gender, or location.

Let me emphasize this point. While we clearly believe that there are commercial benefits that will flow from the Internet, Bell Atlantic is equally committed to our historical role as a network of *individuals*. Just as the telephone has interconnected us all, there is no technical reason that the same should not hold true for the Internet.

It will, however, take time. According to a recent survey conducted by the Times Mirror Center for the People and the Press, only 12% of households have a modem-equipped computer, and just 6% of Americans, roughly 11 million people, regularly go on-line.

These statistics may seem discouraging, but they are offset somewhat by a Dataquest survey which indicates that personal computers purchased for use in the home will account for almost half the U.S. PC market by 1998. Last year over five million new PCs were bought for the home, and that number is expected to rise to almost fourteen million by 1998.

Regardless of which figures one uses, this much is clear: the vast majority of Americans are *not* connected to the Internet today. To many this is obviously a potential business opportunity. To America, it is a once-in-a-lifetime opportunity to shape the network of the future.

Access to the Internet in rural areas.

In addition to the hurdles just cited, rural Americans are confronted with a disadvantage that urban-dwellers do not face. This is the cost of long-distance charges to reach various information providers, which often offer local-number access to customers in major cities but cannot economically provide such an option in remote areas.

While it would be irresponsible to imply that it is a 'silver bullet' solution to this problem, Bell Atlantic believes that permitting us to provide long-distance service would help us to construct effective methods to compete with current providers in offering Internet service throughout our region.

In short, our goal is to serve our customers. In analyzing the case for offering Internet services, we must be diligently aware that there are pitfalls ahead. We must be mindful that there is no free lunch, and we can expect the Internet to suffer growing pains just as any adolescent does.

Bell Atlantic is committed to the vision of the NII, and we solidly support the Internet as a fundamental component of the networks of today and tomorrow. I thank the subcommittee for this opportunity to illustrate that commitment.

Attachment A

Scenario: To provide functional Internet access for a small customer base, with sufficient technical support to ensure customer satisfaction.

Assume: 1,170 customers
78 simultaneous users at any given moment (6%)

Element	*Annualized capital*	*Annualized expense*
Terminal server w/analog modems @ 14,400 kilobits	$ 20,000	$ 2,000
ISDN router w/2 primary rate interfaces	$ 19,000	$ 1,900
10 Base-T Ethernet w/network management software	$ 8,700	$ 870
Router w/SMDS interface	$ 54,000	$ 5,400
Unix computer for:	$ 63,000	$ 1,000
User authentication		
Navigation tools		
E-mail		
Billing data collection		
Billing system	$ 2,300	
Sales costs (sales reps, etc.)		$ 8,000
32 POTS lines		$ 6,000
2 ISDN PRI lines		$ 6,000
SMDS connection		$ 6,000
Operations support		$ 42,000
24-hour help desk		$ 13,000
Floor space		$ 4,000
Advertising		$ 35,000
Product support		$ 7,000
	$167,000	$138,170

Combined annualized capital and expense $305,170

Broad-scale deployment (annualized dollars)
Bell Atlantic serves 6 LATAs in Virginia @ $305,170 $1,831,020

Maximum users on statewide at any time (total ports) 858

Note: For illustrative purposes only. This chart should in no way be considered definitive. Figures cited do not reflect cost of customer premises equipment, usage charges, human resources, and other important considerations.

Mr. BOUCHER. Thank you very much Mr. Young.
Mr. Clapp from Ameritech.
Mr. CLAPP. Thank you, Mr. Chairman.
Mr. BOUCHER. And could you turn on the microphone.
Thank you.
Mr. CLAPP. Thank you, Mr. Chairman, for the opportunity to appear before you and this subcommittee.

Let me begin by describing our plan for Ameritech Internet access service in Michigan. Ameritech will soon offer connections to the Internet to the K-12 schools, public libraries, and community colleges in Michigan. Our service will consist of a fully managed Internet service in each regional calling area, or LATA, within Michigan. A special rate for schools and libraries has been defined, and an $11.5 million matching fund by Ameritech will provide additional substantial discounts and support.

The matching fund will have the following benefits. It will provide the first 1,000 sets of customer premise equipment free of charge to the schools. It will be used to waive the service installation fees for the first 500 connections. It will also be used to waive half of the monthly service fees for the first 18 months for the first 500 connections. It will create the Ameritech K-12 Network Resource Center, access to which will be included at no additional cost to the first 1,000 connections for the first 18 months. The network research center will be vital to help students and teachers, administrators, librarians, and others learn about Internet, its features and benefits. A $500,000 will be granted to the Michigan State University for the development of curriculum modules that will be delivered through the K-12 network resource center.

We hope to connect 20 to 40 schools in the fourth quarter of 1995 and 500 schools by September—excuse me—quarter of 1994 and 500 schools by September of 1995. Our experience with offering the service in Michigan will provide valuable data for the service extension to the rest of the Ameritech region which includes Illinois, Indiana, Ohio, and Wisconsin. We may start to extend the service as early as the first half of 1995, but our offering will be made in a marketplace where there are existing Internet service providers, thus customer demand will be a primary factor in our decision.

Ameritech will also support the Internet as part of the new Internet backbone architecture. This architecture includes four network access points or NAP's. The National Science Foundation has selected Ameritech and Bellcorp to offer the Chicago NAP which connects Internet service, Internet network providers, for traffic exchange in the Chicago area. Ameritech is also furthering Internet access by offering a software tool called WinGopherComplete. This is an affordable Window-based tool which allows personal computer users to easily navigate the Internet regardless of their level of experience.

Ameritech perceives considerable value in offering Internet access service. We will energetically pursue the opportunities before us. However, we believe that the existing regulatory environment has unforeseen and unintended consequences on the ability of the regional Bell operating companies to offer services such as Internet access.

For example, we have analyzed the impact of the long-distance restriction on our cost of offering Internet access. Our analysis indicates that the effect of the long-distance restriction is to increase our capital costs by 75 percent and our expenses by 100 percent. In addition, the long-distance restriction prevents Ameritech from providing a complete end-to-end service, and our customers must deal with multiple IP service providers, multiple bills, and multiple points of contact for service issues. These facts demonstrate the disincentive for regional Bell operating company investment in the Internet access service that is created by the long-distance restriction. Our competitors are not encumbered by such restrictions.

We are grateful for the opportunity to present our perspective to this Subcommittee. Ameritech is committed to proceeding with the K-12 initiative in Michigan, and we will do our best to fulfill its promise of advancing education in that State. Further, we are excited about the potential of the Internet and seek the assistance of the subcommittee in reducing the barriers which we encounter as we strive to make the Internet ubiquitously available.

I will be happy to answer your questions.

[The prepared statement of Mr. Clapp follows:]

TESTIMONY OF

GEORGE CLAPP
GENERAL MANAGER-BUSINESS DEVELOPMENT
AMERITECH ADVANCED DATA SERVICES

BEFORE THE SUBCOMMITTEE ON SCIENCE
OF THE
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES

ON

ACCESS TO THE INTERNET

OCTOBER 4, 1994

TESTIMONY OF GEORGE CLAPP

AMERITECH ADVANCED DATA SYSTEMS

ON ACCESS TO THE INTERNET

Thank you, Mr. Chairman, for the opportunity to appear before you and this subcommittee. My name is George Clapp, and I am General Manager of Business Development for Ameritech Advanced Data Services (AADS), a subsidiary of Ameritech Corporation. The group which I manage is responsible for product development and management of the Ameritech data product lines.

Nurtured by the federal government, and particularly by the National Science Foundation, the Internet community has developed a communications technology which has made a significant contribution to the vision shared by many of a National Information Infrastructure. The adoption of the Internet technology by businesses has created new industries, and Ameritech believes that an Internet access service is of interest both to individuals and to enterprises. Consequently, we are engaged in the efforts listed below:

I. Development of an Internet access service in the state of Michigan. This service will be initially offered to the educational community, but it may be offered to the general public soon after its introduction. We have named our service "Ameritech Internet Access Service."

II. Extension of this service to the other four states within the Ameritech region: Illinois, Indiana, Ohio, and Wisconsin;

III. Offering of a "Network Access Point" service in Chicago under an agreement with the National Science Foundation;

IV. Offering of personal computer software which simplifies the "navigation" on the Internet;

V. Active participation in organizations within the Internet community.

Each of these efforts is described in greater detail below.

I. K-12 INITIATIVE IN MICHIGAN

Let me begin by briefly describing our plans for Ameritech Internet Access Service in Michigan. Ameritech will soon offer connections to the Internet over our switched data services.[1] This service will be offered initially to K-12 schools, public libraries, and community colleges in Michigan. Ameritech Internet Access Service will consist of a fully managed Internet service, based on high speed links to Ameritech's Internet system in each regional calling area, or LATA (Local Access and Transport Area), within Michigan. A special rate for schools and libraries has been defined, and an $11.5 million "matching fund" investment by Ameritech will provide additional substantial discounts and support.

The Internet service Ameritech is implementing in Michigan is based on eight switch centers constructed by Ameritech Advanced Data Services throughout Michigan.[2] AADS switching centers in Michigan are currently installed in Southfield, Ann Arbor, Pontiac, Lansing, Grand Rapids, and Saginaw. New switch sites will be built in Marquette and Traverse City, with a potential for additional sites depending on marketplace demand. Participating schools would be provided with a fast switched data service from the school premises to the nearest switch site, at which there will be Internet access equipment, i.e., routers.

Because of the long distance line of business restriction of the AT&T consent decree, Ameritech's network can carry Internet traffic only within a LATA. Traffic that exits a LATA destined for the greater Internet[3] will be handed off to another Internet provider. Pursuant to equal access requirements, each AADS customer must select a carrier for their wide area Internet service. AADS will bill the customer for the intra-LATA service, and the customer should expect that their chosen wide area Internet provider will charge an additional rate for access to the greater Internet[4]. There are other impacts of

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1 "Switched data services" refers to the fast packet services of Frame Relay, Switched Multi-megabit Data Service (SMDS), and Asynchronous Transfer Mode (ATM).

2 There are five LATAs in Michigan. Some LATAs are planned to have more than one switch site.

3 By "greater Internet" is meant the aggregation of independent networks across the world which make up the Internet. The intra-LATA Internet access service offered by Ameritech will be a part of the greater Internet.

4 Since the Ameritech Internet Access Service is an intra-LATA service only (consistent with the long distance restriction), Ameritech must invite long distance Internet providers to connect their service into the LATA. Ameritech will charge the Internet provider a rate based on the cost to accept the connection and to route customer data traffic to the provider of the customer's choice. Therefore, costs to connect the Ameritech intra-LATA Internet service to the greater Internet are recovered by charges made to the long distance Internet providers. This arrangement allows both Ameritech and the long distance Internet providers to derive revenue from Ameritech Internet Access Service customers.

the long distance restriction on our ability to offer the service and we will discuss them in our conclusion.

A K-12 Network Resource Center for support and training services which are specific to the K-12 community is being developed by Ameritech. The Network Resource Center will be vital to help students, teachers, administrators, librarians and others learn about Internet, its features and benefits. Training and support provided by the Center will encourage the use of the Internet and will help to generate acceptance and demand for the service by the community. Ameritech is interested in learning from the educational community which additional services they would like to have provided by this center. The center will cooperate with existing and emerging K-12 technology support organizations throughout the state.

Subsequent to the introduction of the Internet access service over the switched data services, AADS will offer dial modem (SLIP/PPP[5]) and ISDN access to its portfolio of Internet access methods. These services will be available in some areas in Michigan in the fourth quarter of 1994 or in the first quarter of 1995. The dial-up access service will be less costly than the switched data services and, therefore, will be of interest to a larger educational community.

The Ameritech Internet Access Service includes the deployment of customer premise equipment (CPE) for the Internet connection: a router, a digital service unit (DSU), and a diagnostic modem. AADS will manage the router. The service connect point to the school will be the Local Area Network (LAN) interface. The school is expected to have a LAN and to connect to the router. AADS will provide a complete Network Operations Center (NOC), located in Southfield, Michigan. A Network Information Center (NIC) service is also provided by AADS, located in Ann Arbor. AADS will monitor the service, including the router, to ensure 7 days per week, 24 hours per day availability.

How does the Ameritech matching fund affect Internet service to the educational community? The benefits are as follows:

- The first 1000 sets of CPE will be provided by the Ameritech matching fund;
- The Ameritech matching fund will be used to waive the installation fees for the Internet service for roughly the first 500 connections;
- The Ameritech matching fund will also be used to waive half of the monthly Internet service fees for the first 18 months for roughly the first 500 connections;

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5 Serial Line Internet Protocol and Point-to-Point Protocol

- Funds from the Ameritech matching fund have been allocated to form the Ameritech K-12 Network Resource Center, access to which will be included at no additional cost to the first 1000 connections for the first 18 months;
- $500,000 will be granted to Michigan State University for the development of curriculum modules that will be delivered through the K-12 Network Resource Center;
- The balance of the funds will be used to build the network infrastructure.

Since the fund is limited, the discounts will be available on a first-come, first-served basis. The first 500 schools will receive significant discounts, the next 500 will receive some discount, and the remaining schools will be connected at the standard educational rates. Once the first 1000 schools qualifying for the CPE/routers are connected, AADS will continue to offer an ongoing Michigan K-12 rate that is significantly lower than the commercial rates for Ameritech Internet Access Service.

AADS wishes to connect 20-40 schools to the Internet in the fourth quarter of 1994. Our goal is to connect 500 schools by September, 1995.

II. EXTENSION OF AMERITECH INTERNET ACCESS SERVICE

Our experience with offering Ameritech Internet Access Service in Michigan will provide valuable data to assist in the development of plans to extend the service to the four remaining states within the Ameritech region: Illinois, Indiana, Ohio, and Wisconsin. We may start to extend the service as early as the first half of 1995, but our offering will be made in a marketplace where there are existing Internet service providers, thus customer demand will be a primary factor in our decision.

Provision of a Minimal Internet Access Service by a Local Exchange Carrier (LEC)

We understand that ubiquitous and affordable dial-up access to the Internet, particularly in rural communities, is a concern of this subcommittee. In response to subcommittee staff questions regarding minimal LEC Internet access service costs, we have developed a hypothetical example in which we have roughly estimated the cost of provisioning service to a rural community of 1300 people which is 50 miles from an existing Internet provider point of presence. Provision of this service requires, at a bare minimum, the following equipment and service[6]:

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6 These are approximate list prices and discounts may be available if purchases are made in sufficient volume.

- Eight modems ($1600);
- 8 port combined terminal server and router ($2000);
- Digital Service Unit (DSU) ($750);
- Transmission facilities (56 Kbps, 50 miles) ($300/month);

It must be emphasized that this would be a very basic service and represents an absolute minimum level of service in which users with TCP/IP-capable [7] personal computers would use the LEC service for dial access only. This configuration would enable up to eight people from the community of 1300 to use the service at any given moment. Although eight out of 1300 is a small number, more can be supported with additional equipment if demand warrants. The value added by the LEC is user authentication, protocol conversion, and minimal routing capability. Additional services such as training, end user support, email, and news groups are not included. These services could be provided by an existing Internet provider with whom the LEC has established a business relationship.

At this time, Ameritech does not intend to deploy this configuration due to its severe limitations which include the following:

- Slow speed of dial access. Current maximum speed are 28 Kbps on analog modem and 128 Kbps on ISDN. This can be frustrating for some users who may wish to use the more advanced features of the Internet such as encoded audio and images;

- These slower speeds are inadequate for the business community without whose participation the opportunities for electronic commerce are reduced.

Provision of a Robust Internet Access Service

At the request of subcommittee staff, we have completed some initial estimates of the costs to build a more functional, higher capacity network capable of providing ubiquitous Internet access over both our dial and switched data services throughout a LATA. Although it is an accurate statement of our anticipated network architecture, these are estimates and do not reflect actual Ameritech deployment plans. By "ubiquitous" is meant dial access to the Internet on a "local call" basis in every local calling area within a LATA. The following diagram depicts the network architecture:

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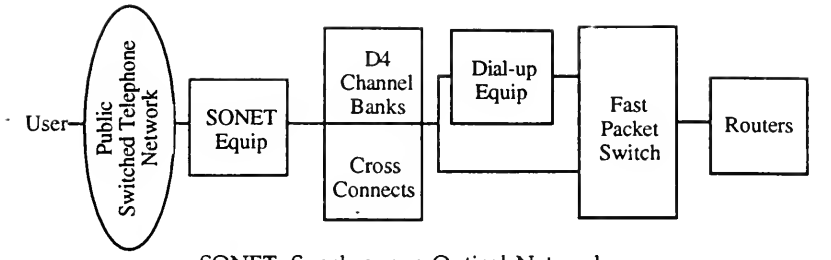
7 Transmission Control Protocol / Internet Protocol



SONET: Synchronous Optical Network

The SONET equipment, D4 Channel Banks, and Cross Connects are transmission equipment which provide the fundamental transmission circuits between subscribers and switching equipment; dial equipment receives calls placed by subscribers who may use either modems or ISDN; the Fast Packet Switch supports a variety of switched data services; and the Routers provide the Internet services. Approximate list prices for this equipment are the following:

Site Construction:	$205,000
SONET equipment:	$250,000
D4 Channel Bank:	$53,000
Cross Connects:	$72,000
Dial-up equipment:	$6,250,000
Fast Packet Switch:	$720,000
Routers:	$665,000

This architecture and accompanying cost estimates would provide the highest level of functionality and capacity and would likely be deployed in major metropolitan areas. A smaller and less costly configuration could be used to serve LATAs with lower customer demands. The above costs reflect list rather than volume-discounted equipment prices and include enough equipment to provide the entire population of a major metropolitan area with Internet access on a local call basis. Ameritech would not purchase equipment at these prices and initial deployment will be sized to anticipated demand.

Customer demand for other data services in addition to Internet access will also drive our network deployment decisions. Whenever possible we seek to deploy a multi-service, rather than a single service, network. The above configuration reflects these goals and represents Ameritech's target network architecture for switched data services.

III. THE CHICAGO NETWORK ACCESS POINT (NAP)

The National Science Foundation, in its effort to further evolve the Internet, the NSFNET, and National Research and Education Network infrastructure, has issued a solicitation which will substantially change the nature of Internet routing and operations. The level of commercialization of the Internet has prompted NSF to define a new architecture for NSFNET, which can serve the needs of many communities including government, research, education, and commercial users. One of the components of the new architecture is a set of four Network Access Points (NAPs), located in San Francisco, Chicago, New York and Washington, D.C. NSF has selected Ameritech Advanced Data Services and Bellcore to offer the Chicago NAP, which will connect Internet network service providers for traffic exchange in the Chicago area.

AADS is committed to the successful operation of the NAP and to its role in providing a high level of quality and reliability for Internet transit services.

The architecture being developed by NSF establishes a commercial network service provider industry which should be extremely productive. Ameritech Advanced Data Services' role in providing the Chicago NAP will be very important in establishing a high performance, well connected, and reliable Internet.

IV. AMERITECH SOFTWARE OFFERING

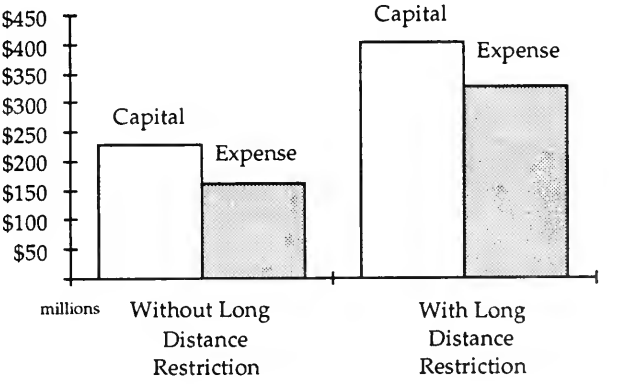
Ameritech is offering a software tool named WinGopher™Complete through a subsidiary, Ameritech Library Services. This is an affordable Windows-based tool which allows personal computer users to easily "navigate" the Internet regardless of their level of experience. WinGopher™Complete includes all the software to automatically connect a personal computer to the Internet. The package includes a graphical interface application and thirty minutes of free service with an access provider. WinGopher™Complete was commercially available starting in March, 1994, and over 15,000 copies have been sold, primarily to academic institutions and public libraries.

V. PARTICIPATION IN THE INTERNET COMMUNITY

Ameritech is an active participant in various organizations within the Internet community. For example, we are members of FARNET (Federation of American Research Networks), and Founding Organizational Members of the Internet Society. Also, personnel within AADS regularly attend the Internet Engineering Task Force (IETF) and are members of a number of technical working groups. Finally, I was recently elected to the board of the Internet Society's Advisory Council.

CONCLUSION

Ameritech perceives considerable value in offering an Internet access service. We will energetically pursue the opportunities before us; however, we believe that the existing regulatory environment has unforeseen and unintended consequences on the ability of the Regional Bell Operating Companies to offer services such as Internet access. The graph below depicts the costs of offering the service with and without the long distance restriction of the AT&T consent decree. The graph extends the estimates described in section II to Ameritech's capital and expense costs for deployment of Internet access via local call to every access line in our region. The significance of this graph is its demonstration of the disincentive for Regional Bell Operating Company investment in Internet access service that is created by the long distance restriction.



Offering a ubiquitous Internet access service with the burden of the long distance restriction would increase our capital costs by 75% and expenses by 100%. The following factors contribute to these additional costs:

- LATAs in which there is low customer demand cannot be served from other sites in other LATAs;
- Customers of our switched data services frequently demand redundancy within our network to assure service availability. Because of the long distance restriction, we cannot use sites in other LATAs to provide that redundancy;
- Current Internet routing technology requires us to dedicate a router to each long distance Internet provider in each LATA. With relief from the long distance restriction, we would eliminate the majority of these routers and their associated costs.

In addition to the increased costs, the long distance restriction prevents Ameritech from providing a complete end-to-end service, and our customers must deal with increased complexities such as multiple IP service providers, multiple bills, and multiple points of contact for service issues. Our competitors are not encumbered with such restrictions.

Ameritech's Internet Access Service must be priced competitively with respect to other providers' service to have a chance of being successful. The additional costs which we have just outlined reduce our ability to compete and expand the service to rural areas. If the long distance restriction of the AT&T consent decree were removed, we could provide an enhanced level of service at a dramatically reduced cost. This is a clear and compelling example of the barriers to private sector investment that must be removed in order to fulfill the vision of a National Information Infrastructure.

We are very pleased that the House passed legislation earlier this year that would lift the long distance restriction and regret that the Senate did not take similar action. We look forward to action in the 104th Congress to lift this and other burdens in order to provide incentives for investment in the National Information Infrastructure.

We are grateful for the opportunity to present our perspective to this subcommittee. Ameritech is committed to proceeding with the K-12 initiative in Michigan, and we will do our best to fulfill its promise of advancing education in that state. Further, we are excited about the potential of the Internet and seek the assistance of the subcommittee in reducing the barriers which we encounter as we strive to make the Internet ubiquitously available.

gc/cg 9/30/94

Mr. BOUCHER. Thank you very much, Mr. Clapp.

Mr. Schrader.

Mr. SCHRADER. Thank you, Mr. Chairman.

I am the cofounder of PSI, and we are lucky or unlucky enough to be the largest Internet provider in the world at the moment. We grew from zero customers in 1989 to well over 6,000 at the moment. In some sense, the panel before us in their anecdotal evidence validates what we believe in as well and what remains constant for the next few years. There is, however, a lot of disinformation out there, or misinformation out there, that I hope we can address today.

One of the questions that I think you are asking is: Why doesn't the telephone company offer Internet access? Because there is no one better than the telephone company to do that; and the reasons are several. One is, they are doing it, it is just a question of when will they do it in a ubiquitous manner at a price that is available to the physician that was on the earlier panel and his budget.

There is some reason that they are not in the lead in the Internet, and small entrepreneurs like PSI and UUNet and other—there are, as Mike Staman mentioned, well over 200 Internet service providers in the U.S.—why are they doing it and the telephone companies are not doing it? One of the answers is that it is a computer business, not a telephone business. So the people that own telephone systems are big and they all have B's at the end of their balance sheet instead of K's or M's for kilodollars or millions of dollars.

If you have billions of dollars, you are burdened by a certain attitude, which is stability. You must have stability, and you can't invest in the technology required for the Internet if you know it is going to roll over and have to be retired or obsoleted within 12 to 18 months. It is a difficult challenge for the telephone companies to do that.

We, on the other hand, have the flexibility of rolling out our growth in such a manner that we don't put out to 400 cities at one time, we do one at a time, and so do all of our smaller competitors. At the moment, we have 76 cities, domestic cities, covered, which is nowhere near my estimate of 2,000 that are interested in Internet access at the moment. If you look at BT Tymnet in a previous technology called X-25, they did 800 cities. They were a business service, and they felt that 800 U.S. cities was the right number. I believe it will be 2,000 based on a number of studies that we have done in house.

The second thing is, the reason the telephone companies are not today well matched to the Internet is that the Internet is a bottoms-up marketplace. The customers are in control not only of the amount of money they are willing to pay, which is what the phone company sees, but for us it is what applications they choose to run. They must control the applications. So like you said, they have the computer or don't. If they don't have a computer, then they are out. They have to have the software, they have to have the communications software, they have to have the knowledge to run those things, they have to have a modem, and they have to have access to a telephone line. In most rural school districts you can't even

find a telephone line in a classroom still. So there are many challenges that you face that I don't feel good about. I wish you luck.

In the commercial world in the Internet, we recognize that world, and what we try to do is make it simple and low cost. So for the Morrisville School District what we did, we provided service to them. What we did was exactly what you might say is the voluntary effort on our part to lower the cost of the dial-in access by growing as fast as we could as large as we can and basically reaching the economy of scale that we have.

So the natural effect of economy of scale is that when you have 60,000 customers, the eventual per user costs will go down, and what you are asking to do, I think, from this panel and the previous panel, is when and under what circumstances will we get this 600,000 customers so that the cost is down to $30 instead of $300 instead of $2,300? I don't have the answer to that, but I believe that is your question.

One other issue that keeps the Internet in its current realm is that it remains an art, it is not a simple engineering problem. The telephone companies have exquisite laboratories that rival any entrepreneur's best team. However, they do not have those experts in the field. The high quality union labor that is strapping lines together across rivers and valleys do not carry computers on their belts, and that is what the Internet is, it is a computer system that uses the telephone world, it is not the telephony world doing the actual work.

So when the stability occurs in the marketplace, when the users stop growing new applications—right now there are over 10,000 programmers using TCPIP inside of companies writing code and developing new applications. One of them, for example, is videoconferencing. When videoconferencing was developed in the Internet, it is done by the individual users and the programmers. When it is done in the telephony world, it is done more in a centric role where very senior designers come up with the quality requirements, the technology, and the software to run it, and those are the specifications that are handed to the marketplace, and the marketplace decides whether to buy it or not. In the Internet, the individual users, not the providers, actually develop the code, develop the hardware, and then start using it across the common interface on the Internet. It is a very different world.

I believe the real question that you are asking is who will pay, not why the telephone company won't do this, because in the end all the telephone companies will and so will the cable operators, but who will pay for remote access? In a sense, it is a question of bypassing the interexchange carrier. Just like there is a local exchange carrier bypass system called the competitive access providers. What the Internet is doing is, when a node exist in a rural town, they no longer have to make long-distance calls, and therefore the cost structure provided by the interexchange carrier is no longer covered. That will happen at some point in time, and I actually agree with Mike Staman that what the Government should do is to encourage, at least with words, the development of the point source Internet providers, the three guys in a garage that want to become Bill Gates that live in Madison, Wisconsin, or a smaller town like whatever the town was in Oregon. They can and will

build an Internet service, because it only takes a Sun spark station and a circuit into Pac-Bell or U.S. West, wherever they are, and they are on the Internet and they can start selling service to the local community. If they can't make a go of it, then that means the local buyers are not willing to pay, and I question whether or not the work should be done to bring it to them.

Thank you.

[The prepared statement of Mr. Schrader follows:]

Performance Systems International, Inc.
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U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Science

Hearing on Internet Access

4 October 1994

Statement of
William L. Schrader
Chairman, President and CEO
Performance Systems International, Inc.
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Chairman Boucher and members of the Committee, thank you very much for the opportunity to appear today to participate in your discussion and review of the opportunities which the Internet may offer rural Americans. I have read the background brief for this hearing and would like to begin my comments by commending those responsible for writing it. I feel that it is both concise and accurate.

I will begin by answering the stated questions and then I will offer recommendations

1. What approaches are being taken by commercial access providers, local exchange carriers, and government agencies to provide broader Internet access?

A. Quality Commercial access providers, now commonly called Internet Service Providers (ISPs), are improving the quality of service so as to handle an increasing number of customers and newer, more demanding applications such as Mosaic on the World-Wide-Web. Quality has been enhanced by the:
- use of advanced switching technology now available from the RBOCs, Inter-Exchange Carriers (IXCs), and by-pass carriers, including technologies such as SMDS, ATM, ISDN and Frame Relay;
- deployment of more and better modems, making even better use of the public switched telephone system;
- improvement of the software and systems integration technology between and among the ISPs such that reliable and timely exchange of data is more easily achieved.

B. Geographic Coverage ISPs are expanding the coverage of the Internet domestically into smaller cities, reaching millions of new customers each year.

C. Security ISPs have improved Internet security by:
- removing the switching centers from older locations at academic premises to new, secure, dedicated commercial facilities;
- developing Internet security systems which can extend across several ISPs.

D. Privacy ISPs have begun to insist on guaranteed privacy for their customer's traffic. Several ISPs have implemented interconnection points which guarantee:
- no government Clipper technology, or similar technology, will be used to wire-tap or otherwise violate the privacy rights of the customer's data and messaging traffic;
- no customer usage statistics will be gathered for any reason.

E. RBOCs The Bell Operating Companies have continued to express interest in offering Internet access services. However, from PSI's perspective, the primary RBOC contribution has been the dissemination of ISDN service: now

fully compatible as a feeder system to the Internet. In fact, if the ISDN tariffs were set lower, it would allow small businesses and individuals the opportunity to use the ISDN system more routinely!

F. Government Agencies The good news is that the NSF appears to be removing itself from active participation in commercial Internet evolution. Removal of this constraint will allow a commercialized Internet to provide the best product, at the lowest price, in the earliest time frame.

The bad news is that it appears other agencies are not following suit and remain convinced that government has a role to play in moving technology into a production quality commercial networking infrastructure.

2. Is a greater degree of Federal involvement needed to provide more widespread Internet connectivity.

In PSI's perspective, the state and Federal governments have a limited role to play in the Internet; specifically as consumers of networking services. However, I will specifically address several commonly asked questions of how "government can help":

A. Regulation We believe the consumer is well served by competition and therefore does not need the pricing or performance protection offered by the PUCs. Further, the RBOCs are not highly constrained in offering Internet access by the PUC regulatory environment. ISPs do not require protection against the activities of the IXCs or RBOCs or large cable operators.

B. Standards Setting The Internet has its own stable and time tested standards body which has worked from a grass roots paradigm for many years. Traditional standards bodies, such as the International Telecommunications Union, are dominated by the carriers and governments. This approach should not be extended to the Internet.

C. Technology Development The government's most recent contributions to Internet technology have been severely outdated and behind the state-of-the-art. They have not had the desired effect. The Internet environment is characterized by rapid technology obsolescence and fast changing consumer demand. Government Industrial Policy in this arena will necessarily lag and, therefore, do an inefficient job of allocating tax dollars.

D. Universal Service Down through history, government has provided universal service for telephone and electricity. It has provided living essentials through the food stamp program. However, at no time did the government provide cable-TV stamps, radio stamps, newspaper stamps, book stamps or even postage stamps. These are the forerunners of the information highway.

They have been stable for dozens of years. At no time did the government feel obliged to fund such information access by the poor or rural communities.

In the Internet, as the Background piece explained, users must have a PC, software, a modem, and a service. And, they must know how to use these systems and be interested in accessing remote information. Clearly, the cost is much larger to deliver Internet access to people without the hardware, software, service and knowledge to use it.

E. Non-Profit Network Subsidy The NSF has long funded Regional Networks with the aim of seeding of Internet growth. The Internet is now beyond its infancy and the NSF has recognized the fact the non-profit Regional Networks must stand on their own to compete with for-profit industry if they are to survive. This policy of commercialization should be continued with the caveat that Government should continue to subsidize selected non-profit institutions such as universities, colleges, libraries and hospitals. These funds can then be used to purchase services from the commercial Internet.

3. Who are the current Internet connectivity providers?

There are four general categories of ISP in mid-1994:

A. Point Source Commonly called "mom and pop shops", these are small businesses. They usually operate in one physical location and offer services to business and individual consumers within a single metropolitan area. Digital Express exemplifies this approach in the Washington DC area.

B. Regionals Typically, these non-profit entities evolved from activities begun during the 1980's. These are university affiliated enterprises which offer services within one state or within regional interstate areas. The Regionals seldom compete with one another and have historically received the lion's share of NSF's networking budget (along with Merit, Inc. which ran the now ending NSFNet Backbone service). SURANET in the SE US, NEARNET in Boston, NYSERNet in NY State and BARRNET in the CA Bay Area are examples.

C. National Independents These are commercial, for profit entities offering services nationwide or internationally in some cases, which are positioned to compete in the evolving commercial marketplace against the "Big Guys". PSI and UUNET are among the firms presently competing in this market.

D. "Big Guys" These are IXCs, RBOCs, and Cable TV operators with balance sheets of billions of dollars who must enter the ISP market or risk embarrassment as having been left behind. Sprint was first to enter in 1991,

with AT&T in 1993, MCI and Ameritech in 1994, and others announcing monthly. The RBOCs and IXCs have **not** been aggressive entrants due to several issues:

- the market is small, totaling only $150 million in 1994;
- the technology "rolls over" very often, perhaps as often as once a year. Since the large firms chose to deploy hundreds (or thousands) of switches, in massive deployments, they cannot afford to write that investment off so quickly;
- the computer applications skill sets required to operate as a competitive ISP are generally found in the telephone company laboratory but not in the skilled union crafts such as linesmen or splicers, this must change for their service offerings to become competitive; and
- the efficiencies of the Internet technology might put price and performance pressure on existing telephone company services which could produce a net decrease in revenue.

Who are the likely providers of the future?

The answer to this question will be read carefully by all Wall Street investors and it is not wise to comment directly on the record. However, in general, small independent players will survive if they find a niche market in which to operate, while the regional and national independents must compete against the Big Guys on cost.

What are the obstacles to offering Internet access faced by the RBOCs?

The only real obstacle is will-power. However, Internet will likely be used by the RBOCs to help justify a loosening of the regulations which, today, prevent them from selling services against the cable TV operators and the IXCs.

How are providers making an effort to make Internet access readily available in rural America?

ISPs are building new Points-of-presence (POPs) in more and more cities and this trend toward expansion is inevitable. Today, PSI provides service in 76 domestic cities. In prior technology deployments, such as X.25, BT Tymnet thought that 800 cities was the correct number of POPs to build. We believe this is a small number and over 2,000 POPs will be needed to serve the marketplace in the year 2000.

4. What are the particular obstacles to Internet access faced by potential non-traditional, non-urban Internet users, such as schools, libraries, small businesses, and rural residents?

There are no obstacles for rural residents who are technically astute and interested in obtaining Internet access. The cost is slightly higher, but the service is identical to that delivered in the largest city. The costs of food and

housing is typically lower in rural areas, while the costs of communications and computers is typically higher. Internet is no exception. In time, perhaps as soon as 24 months from now, ISPs will operate in nearly all the small towns and cities of the U.S.

What benefits do these groups reap when they become Internet users?

What benefits accrue from reading ability? The ability to read opens a world of possibilities because it provides the freedom to explore. Exploration feeds our basic need for learning and satisfies our requirement for new knowledge. Exploration and knowledge have driven every advance in modern civilization.

The Internet opens new pathways to knowledge. The benefits from that knowledge, and the learning that follows, will benefit not only the user but our society in general.

Recommendations

With all due respect for the dozens of dedicated government program managers and hundreds of contractors who have contributed to the development of the Information Highway and NREN related technology, I make the following recommendations:

1. Cease Funding Production Infrastructure Government should not provide direct funding to obtain and operate infrastructure, unless it is committed to competition with commercial ISPs and the need for continuous upgrade of hardware and software to maintain reliability and performance.

Short of this commitment, it is not efficient for states to own infrastructure and hire people to perform services that are available more cheaply by outsourcing.

In addition, a policy that requires the government to compete with commerce, thereby stemming the generation of tax revenues, is philosophically bankrupt.

2. Subsidize Libraries (to provide access to the poor) If this is a national priority then Congress should provide matching funds (no more than 50%) to all rural libraries who are interested in participating. The funding should be for hardware, software, modem, dialup or circuit access to an ISP, and training. Three years of subsidy should provide sufficient seed for the libraries to finance this access on its own.

3. Prevent Libraries From "Reselling" to Small Businesses In third world countries, farmers are wiped out financially when the US sends in hundreds of tons of free grain. The same fate awaits the small ISP business in rural America when they are forced to compete with government funding.

A subsidized infrastructure can be used to provide truly free service to individuals in specific instances but should not be used to retard competition.

Specifically, this means that libraries should be:
- prohibited from issuing domain names to its users, thus libraries are prevented from serving small businesses in competition with ISPs; and
- prohibited from allowing PPP or SLIP access from remote sites, thus libraries are prevented from serving individuals with the required hardware, software, knowledge and only lacking a service who would normally buy that service from an ISP;

4. Fund True Infrastructure Research (not ATM, FR, IP)

Advanced technology research in the university sector warrants funding from government research program managers who use competent peer review procedures.

5. Guarantee US Citizens Right to Privacy Defeat the Digital Telephony Bill (S. 2375 and H.R. 4922) and prevent the NSA, FBI, DEA and domestic police agencies from having the ability to violate our privacy rights.

6. Cease and Desist Developing and Deploying Clipper Type Technology Right of privacy extend to all messages sent or received regardless of content and the government should not place itself in the position of violating those rights. Despite the assurances from FBI Director Louis Freeh, officials at NSA, and members of the Clinton administration, the Clipper technology requires that violations of privacy occur. We believe it is essential that Congress properly represent the interests of the citizenry. The right of privacy should be protected from this type of political extortion.

Mr. BOUCHER. Thank you very much, Mr. Schrader.

Mr. Williams.

Mr. WILLIAMS. Thank you, Chairman Boucher.

I am here today representing FARNET, the Federation of American Research Networks, where I serve as Executive Director. I have participated in this adventure of building the precursor to the National Information Infrastructure for a number of years, most recently from Merit Network where I was responsible for the NSFNET project and prior to that from the University of Nevada system where I initiated and built a Statewide research and education network.

FARNET's mission is to promote Internetworking to support and enhance education, research, library access, health care, economic development, and citizen empowerment. We were founded in 1986, and since then our membership has expanded to include a number of other participants beyond those that were originally part of the NSFNET program. Forty percent of our members today are statewide networks like the Virginia Education Research Network, NYSERNet, NET Illinois. Mr. Schrader's organization, Mr. Staman's organization are members of FARNET, as are a number of interexchange carriers, AT&T, MCI, Sprint, Ameritech, and Bellcorp, so several—a number of organizations that support our mission. I think it is fair to say that our member organizations built the Internet in the United States that our citizens enjoy today.

Let me summarize some recommendations in response to the questions that you had posed.

First, we recommend that the committee consider some sort of fiscal offset of incentives to help extend physical Internet access and distribution services to those areas that are underserved, and let me explain a bit. It seems that unless the enterprise is provided by the Government like PTT's are in some other nations, we must provide some probability of return on investment.

The cost to provide service and promise of return for services to geographically or economically challenged areas therefore must either be higher or subsidized by others in some fashion, and I think it is the committee's hope that these services can be provided at something other than greater cost. An obvious alternative is some form of cross-subsidization.

Another alternative might be some sort of Federal differential for those areas or institutions that are economically most difficult to serve. If the Government is to consider that second alternative, we would recommend that the process be competitive but that consortia be allowed.

Two, we recommend further evaluation of allowing providers to form local alliances that would interconnect infrastructures. It is probably unrealistic to expect that allowing open competition for network services to rural America will result in coax fiber, copper, and satellite dishes to every home and institution. I understand Congress has explored some of those issues this year and had difficulty with them, and I also understand that some States may be able to allow such alliances. If so, I think that might provide us some useful data to look at.

Three, we recommend that the Federal Government continue to support Internet working for the research and education community and encourage partnerships with industry. Most of the technology that makes Internetworking usable today has its origins in the research and education community, primarily from America's universities and their affiliated organizations like supercomputing centers and midlevel networks. Further, much of the content on the Internet is facilitated or provided by these same organizations, and providing affordable access to the underserved areas would be of limited value if the content isn't available. So we recommend that you continue to invest in the public good by supporting networking and network services to America's educational and research institutions.

Finally, we recommend that you monitor the health of the Internet in the United States over the next year or two and stand ready to modify levels and types of support if necessary. As you know, the NSFNET program is in transition. The midlevel networks hold much of our Nation's intellectual capital of advanced networking technology, and the public good roles that they serve shouldn't be allowed to suffer as a result of a policy time frame that stops Federal support too early.

This concludes my remarks. Thank you, Mr. Chairman, and thanks for finding time for this hearing.

[The prepared statement of Mr. Williams follows:]

Testimony of:

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Hearing on Internet Access

Subcommittee on Science
Committee on Science, Space, and Technology
U.S. House of Representatives

September 13, 1994

Chairman Boucher and members of the Committee, thank you for the opportunity to present testimony regarding this very important issue. I am here today representing FARNET, the Federation of American Research Networks, where I serve as Executive Director. I have participated in this grand adventure of building the precursor to the National Information Infrastructure for a number of years - most recently, from Merit Network, Inc. at the University of Michigan where I had responsibility for national networking projects including the NSFNET project. Prior to my service in Michigan I was responsible for networking services for the University of Nevada community and initiated and implemented NevadaNet; a state-wide research and education network.

FARNET's mission is to promote Internetworking to support and enhance education, research, library access, health care, economic development, and citizen empowerment. FARNET was founded in 1986 by the leaders of a group of state and regional computer networks linked to NSFNET, the national backbone network established by the U.S. National Science Foundation (NSF). Membership quickly grew to include other network service providers and organizations with an interest in its mission. Today we include among our 36 members, not only those original not-for-profit organizations and some for-profit progeny, but also Inter-Exchange Carriers such as AT&T, MCI and Sprint, Local Exchange Carriers such as Ameritech, affiliate organizations such as Bellcore, and manufacturers of Internetworking technology such as Cisco. FARNET's member organizations built the core of the United States Internet our citizens enjoy today. Two-thirds of our members are not-for-profit organizations. A list of our current members is included in this document.

FARNET has a tradition of helping to identify and clarify issues facing the networking community, seeking consensus resolution, and disseminating its findings for action. Since 1991, FARNET has conducted over twelve major workshops and meetings on various issues concerning the growth of the U.S. Internet. Our most recent workshop focused on identifying issues associated with the pending transition of the NSFNET program. A preliminary report is available and we would be pleased to provide the committee that work and the final report when available.

Background

Most of the background information presented here is based on observations of the NSFNET program, its components and its accomplishments over the last six years. Particular attention is paid to the role of the mid-level or regional networks and our universities since I think their contributions are valuable and germane lessons can be learned from their efforts. The Internet is today much larger than the NSFNET program and includes a rapidly growing commercial market complete with viable private sector providers. It also includes an ever growing number of International networks that require us to coordinate equipment selection, traffic routing policies and protocols on a global basis.

The NSFNET and the role of the mid-level networks

Mid-level networks, often referred to as regional networks, are part of today's three level NSFNET architecture. They provide a bridge between local organizations, such as campuses and libraries and the federally funded NSFNET backbone service. The service area of mid-level networks varies from sub-state, statewide, multi-state to nationwide coverage. Connections to the NSFNET backbone were awarded to mid-level networks as part of a competitive, peer reviewed process and although the mid-levels pay no fees for the research and educational use of the current backbone service, they have made substantial investments in infrastructure and were essential to the success of the NSFNET program. I think they deserve special consideration in this discussion since they have taken the lead in providing network access to a much broader population of scholars. Mid-level networks have been the primary vehicle for connecting America's grade schools, high schools, libraries, and hospitals to the Internet. They have done so with the full and active support of their traditional clients, higher education. Although many American libraries and K-12 school systems have Internet access, the majority have no such service. Today, the mid-levels continue to struggle to provide Internet services to the geographically and economically challenged.

Although the NSF funded a backbone service for the research and education community, a number of viable nationwide, commercial Internet providers have begun operations in recent years diminishing the need for direct government support for such backbone services. While most mid-level networks have received some fraction of the past direct government investment in the NSFNET, today they have become largely self supporting. Since 1988, the NSFNET has grown from a network that provided connectivity for the research community to a general purpose network used by nearly all segments of our society. The limits to use are defined by the NSFNET Appropriate Use Policy (AUP) which essentially requires that the applications be in broad support of research and education. As the NSFNET continued to grow, both in capacity and number of users served, commercial Internet providers arose to serve commercial non-AUP compliant applications and users. The growth of a commercial Internet industry in the U.S. is one of the many

measures of success of the NSFNET program. We anticipate that by May 1995, the chapter on the current NSFNET Backbone Service will come to an end. The mid-level networks will be provided some declining measure of direct funding from the NSF to purchase nationwide services from commercial network services providers. This transition, away from a government provided backbone service to services increasingly provided by the private sector, will be a major milestone in the historical evolution of the Internet in the United States.

The nature of the underlying technology and protocols upon which the Internet is based lends itself to use as a shared resource by all users and devices. Historically, the cost to the user or campus for the use of the network was neither distance nor usage sensitive. As the mid-level networks evolved to provide NSFNET connectivity to America's universities and research institutions, data circuits were leased "wholesale" from telephone companies and then services provided to constituent institutions on a fixed cost basis.

Water distribution systems may be a useful analogy in understanding the technology and economics of the NSFNET program. We can think of the data circuits as pipes that carried bits rather than water. The cost to an institution was generally a function of the size of the bit pipe entering the campus. The campuses installed bit plumbing and bit using appliances, e.g. computers, workstations and routers, and funded these services as they did other parts of campus infrastructure such as classrooms, libraries and water fountains. There was no incremental charge for bit use. The mid-level networks acted like cooperatives that distributed bits from the national backbone to the campuses. The mid-levels leased bit pipes from the telephone companies, added services and management, and then each member of the buying co-op could dip in and take as many bits as they wanted as often as they wanted. The bits continued to flow and were quickly replenished for the next user. If the supply of bits became limited, then the cooperative purchased larger pipes for all to share. The bits were a free and renewable resource contributed by members of the cooperative and cooperatives like them around the world. The federal government provided some of the funding for these pipes, largely through the NSF's investment in nationwide infrastructure (backbone services) and some seed money for these mid-level networks.

The NSFNET and the role of the universities

America's universities are not only beneficiaries of the NSFNET program but have also provided enormous contributions and leadership for the emerging National Information Infrastructure. This leadership has resulted in not only substantial investments in campus infrastructure but a host of innovative computer and network applications. Our nation's campuses, which helped found and support the creation of the mid-level networks through their connections, leadership, and volunteerism, have also provided for their own local networks and Internet service largely with their own resources.

The university development and distribution of Berkeley Unix has had as profound an impact on computer networking as the adoption of the TCP/IP protocols. The Mosaic interface was developed at the University of Illinois and provides a state of the art, multi-media interface for information retrieval. Another example of a university contribution is the Gopher information retrieval tool developed at the University of Minnesota. Internet email systems like Pine from the University of Washington and Eudora with origins at the University of Illinois benefit users around the world. Yet another example of an innovative application is CU-SeeMe developed at Cornell. CU-SeeMe has provided low-cost video conference service to Internet users around the world and is used extensively by participants in the Global Schoolhouse Project. Most of the Internet applications that are pushing the envelope today have been spawned in American universities. The transfer of technology from several of these initiatives has resulted in the availability of commercial products with full support and documentation. Although most of these applications were not developed with direct government support, these innovative products would not likely have been created were it not for the ready and reliable availability of the government funded NSFNET.

The NSFNET backbone

Merit Network, Inc. was awarded a cooperative agreement for management and operation of the NSFNET backbone in 1987 and will continue to operate the backbone service until it is phased out in the Spring of 1995. This backbone service was the largest single government investment in the NSF funded program. In addition to the NSF investment, MCI, IBM and the State of Michigan contributed money, technology, services, and many hardworking individuals to the project. During Merit's stewardship, the backbone capacity expanded from 56 Kb/s (thousand bits per second) to 45 Mb/s (million bits per second) or a factor of more than 700. This expanded bandwidth and speed was not just a matter of buying more capacity - new technology was developed, tested and proven. While the number of users of the service is difficult to quantify, recent estimates of the number of users of the worldwide Internet is over thirty million. Almost all network users throughout the world pass information to or from member institutions interconnected to the U.S. NSFNET.

Another statistic is even more interesting and germane to our discussions here today. The cost to the National Science Foundation for transport of information across this network has decreased by two orders of magnitude. In 1987 when Merit's stewardship of this project began, the cost per megabyte of transport across the continent was approximately $10. By 1989, the cost per megabyte transported was reduced to less then $1.00. At the end of 1993, the cost was thirteen cents. These cost reductions occurred gradually over a six year period. While there were some reductions in the cost of data circuits, the majority of savings resulted from industry equipment vendors incorporating what was learned and developing new faster and more efficient hardware and software technologies. Being able to simultaneously accommodate the dramatic increase in users and the increased bandwidth demands

from new network applications while network transport costs decreased is another indication of the success of the Government's investment in the NSFNET program and partnership with the private sector.

Some comparisons of the Internet and telephone service

The United States has the finest voice system in the world. The telephone companies, the local exchange carriers, competitive access providers, and inter-exchange carriers provide most of the local and long distance data circuits that we refer to as lower or physical layer services. They provide the wire or fiber that allow electrons or photons to flow. Internet service providers add equipment, software, routing and network management expertise on top of the lower layer services to make the Internet communication possible.

The telecommunications industry is very capital intensive. They invest heavily in rights of way, fiber, spread spectrum frequencies, switches and interface equipment, poles and copper wires, the design and deployment of satellites, as well as the hiring and ongoing training of a highly skilled workforce. Once infrastructure penetrates a given area, the financial burden is greatly reduced as the rewards from those investments are accrued. The NSFNET project did not build its own facilities, choosing instead to lease network services from commercial providers.

Local voice service has remained essentially constant and averages less than $20 per month even where costs are usage sensitive. Long distance voice service is usually distance and usage sensitive. Like voice services, the traditional price of data services is distance sensitive - the longer the geographical reach to interconnect an institution's local area network with the Internet, the greater the cost. But unlike voice, the data circuits that make up most of the Internet are not usage sensitive. The advent of newer technologies such as ATM and services like SMDS may allow usage sensitive or metered service pricing according to the quality of services user applications require .

Although there have been numerous enhancements and improvements to the switching infrastructure, the service offered has remained essentially the same; you pick up a handset, enter some numbers and engage in two-way voice communication with someone otherwise out of hearing range. The Internet, on the other hand, has evolved much more rapidly during its comparatively brief history. As you may know, this past week a meeting was held commemorating the 25 th anniversary of the Arpanet project - the Internetwork that preceded the NSFNET. In 1988, it was primarily scientists and researchers who used the Internet to log on to remote supercomputers, transfer large data files, and send electronic mail messages. Today, although still perhaps in ease-of-use and application infancy, multi-media information - moving color images, real-time video and voice, and enormous amounts of publicly available information passes through the Internet serving an ever expanding variety of users.

Technical meetings are often "broadcast" on the Internet. A "radio show" with a focus on network technology regularly airs on the Internet and is available for later retrieval. As mentioned earlier, the low-cost CU-SeeMe video conferencing system is used by schoolchildren across the world. These applications are valuable tools for education and research and continue to place greater demands on network capacity as well as training and support services for communities lacking the necessary technical capabilities.

An important distinction between Internet service providers and telephone service providers, is the amount of resources required for user services. Most users of voice services to not require instruction from the provider in how to use the system. Telephone instruments are purchased in competitive marketplace and are often installed by the consumer. The Internet poses a much greater challenge. Most users today do not install their own equipment and usually require assistance in learning how to use applications. As new applications arise, new training is often required. A considerable fraction of the personnel expense for an Internet service provider is devoted to user services.

The changing role of the telecommunications industry in the Internet

Today, the role of the telecommunications industry in the Internet is changing. Major companies are beginning to participate. For example Sprint, an early entrant into the commercial Internet, has a rapidly growing Internet services business. Performance Systems International is a leader in deploying Internet access via cable systems. Sprint, Pacific Bell, Ameritech, and Bellcore are building some of the key new components, Network Access Points (NAPs), for the new NSFNET architecture in the United States. Metropolitan Fiber Systems, a competitive access provider in major metropolitan areas, is building another of these NAPs in the Washington D.C. area under a cooperative agreement with the NSF. AT&T also became a participant when they successfully competed for a cooperative agreement to provide database directory services to the NSFNET community.

MCI is making an enormous contribution to the current NSFNET project by providing reduced rates for the NSFNET backbone circuits and investing in developing the new technology that operates that system today. In addition, MCI will build the vBNS, a very high speed 155 Mb/s network for high bandwidth applications and research among the five NSF supercomputer centers under a cooperative agreement with the NSF. MCI has also announced plans to enter the commercial Internet business and construction of that set of system services is underway.

Responses to Questions

Question 1. *What approaches are being taken by commercial access providers, local exchange carriers, and government agencies to provide broader Internet access?*

The phrase "Information Superhighway," has caught the attention and imagination of the press, federal and state policy makers and regulatory bodies, and virtually all segments of our society. During the last few years, the telecommunications industry has made sizable investments in extending the reach and switching capacity of its fiber and copper infrastructure. The cable TV industry has spread their broad band coaxial cabling to most communities in the United States. The wireless communication industry is in its infancy and holds additional promise. Direct Broadcast Satellite system providers could broaden the variety and depth of program offerings beyond entertainment to shrink geographical distances and increase educational, health care, and public service uses. These competitive informational access and distribution conduits hold promise for multiple solutions to what has been referred to as "the last mile problem" - linking what is on the street pole to our citizen's homes and offices. The availability of multiple, increasingly affordable, electronic digital communication distribution system has spawned a burgeoning number of new on-line informational services. Distinction between the means of access service and the informational services offered over those access paths is an important concept.

As we look out over the horizon, the stage appears set for these "conduit and content" factors to propel each other forward at least the next one or two decades. As access to a variety of connectivity services continue to increase, competition among conduit providers means greater access for all citizens as costs are driven down and the types of user services offered increase. As the electronic distribution system increases in scope, a more viable marketplace is created. Today, we see both traditional and new information service providers using the Internet for commerce. This positive feedback spurs further investment by the connectivity providers and encourages information providers to expand their content services. FARNET believes it to be in this Nation's best interest for these positive feedback forces be allowed to interact freely with one another in the marketplace.

The growth of information distribution, processing, and access technology is impacting all aspects of life as we know it today. It is important that impediments and artificial barriers NOT be erected to slow the transfer and diffusion of information technology and services. The last decade has demonstrated how annual increases in computer processing power, memory, and disk storage has given our students, faculty, researchers, office workers, and citizens access to these powerful devices at prices that decline over time. Hearings such as this one, along with passage of the High Performance Computing & Communications bill, and the focus in other pending legislation on the National Information Infrastructure have all helped raise

the awareness to computer owners of the utility of wide-area network access for a variety of purposes that can and do improve the human condition.

Today we find a convergence of the computing, telecommunications, Internet, cable TV, entertainment, publishing, and information provider industries. New niche markets and synergies emerge as these intersections occur. As risks are taken to develop these new markets and forge new partnerships and alliances, returns for these risks should be expected and applauded. As we have repeatedly seen, other countries which experimented with different economic models have ended those experiments and are moving as rapidly as they can towards a economic system founded on U.S. principles and policies. We urge this Committee and your Congressional colleagues to view the current telecommunications legislation as analogous to the efforts that went into crafting the Constitution of the United states. A lot of flexibility needs to be built into the framework so the inevitable changes can happen as technology, use, and policies evolve. The convergence of all these industries and technologies into the "Information Superhighway" may, over the next decade, turn out to be more energizing for our economy and useful to our citizens that even the hype might lead us to imagine. It is difficult if not impossible for any of us to anticipate and answer all the questions and hurdles that will inevitably arise.

Question 2. *Is a greater degree of Federal Involvement needed to provide more widespread Internet connectivity?*

As debate on the Information Superhighway unfolds, this committee and others in government, seek to determine an appropriate federal role in developing policies and regulatory positions that both facilitate the Internet's development and simultaneously protect rights of access to our Nation's citizens. FARNET commends Chairman Boucher and members of this Committee for their continued efforts in this regard. As an historical footnote, it is interesting to note that what started out as a government funded project for military and research use twenty-five years ago, today is viewed by some segments of society as important enough to call for a "right to access" for all citizens. FARNET does not endorse a policy that network access should be made available at no cost to anyone who wants it.

FARNET recommends that the federal government continue to support Internetworking for the research and education community and encourage partnerships with industry.

Although the Internet industry in the United States has undergone dramatic growth, the industry is still immature. The Internet is very different than other telecommunications systems and it is not certain that the societal good that has accrued as part of the NSFNET project will be sustained as we venture into this more market driven economy. Because of the unique nature of the Internet, we have no reliable models to follow. As we have created new technology, we have created new communities that have become dependent upon that technology. Any diminution

in level of service would be unacceptable. While we have some entries from the private sector the network with the greatest capacity and reliability is that provided through cooperative agreement with the NSF. We agree with the decision to discontinue direct support for a government funded, general-purpose NSFNET backbone. We are unsure, however, whether the private sector is yet able to provide the same level of service, at an affordable price, to the research and education community. Further, unless there is a clear probability of return on investment, the private sector may not be able to continue the rate of evolution that the NSFNET community has provided and that has kept our nation in the lead in network technology.

Most of the software that holds promise for the National Information Infrastructure is developed by universities who are dependent on continued and even greater capacity Internet services. Although we expect that in the future, private enterprise will begin to offer such software, much of the innovation continues to come from the academy. If we want that innovation to continue, the academy must have reliable, affordable high-bandwidth network services.

FARNET recommends that Congress monitor the stability of the Internet in the United States over the next two to three years and stand ready to modify levels and types of support if necessary.

The mid-level networks have played a very important distribution role between the NSFNET backbone service and the universities, colleges, schools and libraries. In general, they have been at the forefront in providing Internetworking connectivity, training, and user outreach services to these communities. We believe mid-level networks can play an essential role for extending future services to hospitals, health care facilities, public and state agencies, and local communities. Mid-levels also have a pivotal role as we move through this current architectural and policy transition over the next year. These mid-level networks hold much of our nation's intellectual capital of advanced networking technology and the public good roles they serve should not be allowed to suffer harm as a result of a policy time frame that stops federal support too early. The declining level of financial support for Inter-Regional Connectivity for mid-level networks over the next four years may or may not be appropriate. The clear separation between conduit and content or distribution mechanisms and informational services has long been recognized and anticipated and the mid-level networks expect and encourage the private sector to expand its service offerings and replace some of the function formerly provided by mid-levels.

The key to providing affordable access to the National Information Infrastructure lies in the continuation and expansion of the partnerships that have been formed by the universities, mid-level networks and the private sector telecommunications industry. These partnerships should encourage technology transfer from government and university funded projects to the private sector with an expectation that the public good will be served.

FARNET recommends that this Committee consider fiscal offsets or incentives to help extend physical Internet access and distribution services to those areas that are under served.

This incentive would allow a network provider to invest in infrastructure with a greater probability of a positive return on investment. One mechanism could be a competitive RFP process that encourages local telephone companies, cable TV, wireless firms and Internet service providers to bid on developing extensions to their infrastructures to serve such areas. Coupled with such physical extensions could be support for training and the use of Internet applications. FARNET believes user support services to be a very important hurdle for non-traditional Internet communities.

Question 3. *Who are the current Internet connectivity providers? Who are the likely providers of the future?*

The question about who currently provides Internet services is much harder to answer than one might imagine. It very much represents a rapidly moving target. This situation is quite different from the one we faced only two short years ago when only a handful of providers existed. Today, we have a number of large national providers like Sprint, MCI, ANS, PSI, and Alternet. Regional Bell operating companies, competitive access providers, and independent phone companies are increasingly moving to offer Internet data services as well. In addition, regional networks and their constituent states are extending the reach of their connectivity services to new user communities. Devices are now available that allow cable TV subscribers to use channels for connecting computers to Internet service providers. We also see small firms like NETCOM begin in one part of the country and extend their service model to other geographical areas. Dial-up Internet service providers like Prodigy, America On Line, Compuserve, Delphi, and others continue to grow in user base and technological offerings. New community networks, Freenets, and bulletin board dial-up services sprout up daily. At the present time there appears to be no end in sight to these differing means of access to the Internet. The range of speed, service, and price options allow additional degrees of freedom in choosing amongst those seeking access.

Many of today's Internet connectivity providers were not anticipated a few years ago and predicting who will emerge in the future or who will survive from amongst today's growing number of players is difficult. As noted above, we would prefer to see the regulatory climate shift towards recognizing the very real distinction between distribution mechanisms and informational services. Focusing on a framework that allows voice, data, images, movies, and sound to all be handled by each or an allied distribution service - RBOCs, IXC's, Cable TV, Internet Service Provider, wireless, etc. will enable technology innovation to drive competition and the enhancement of quality service.

FARNET recommends further evaluation of permiting communications providers, including local and long distance telephone companies, wireless and cable providers, to form local alliances that would interconnect infrastructures and provide for all information service offerings through the broadband coaxial cable that is present in the majority of our Nation's homes, schools, libraries, community service agencies, and hospitals.

These broadband cables may prove to be more of a benefit for the computer and networking industries than for television. Such Congressional action would acknowledge and sanction for U.S. citizens the technology innovations that America's cable and telecommunications companies are already deploying in many countries overseas. Rather than allow other countries to gain a competitive step on us by using our broadband information technology and human resources, we should take whatever steps are necessary to allow such alliances to further accelerate the deployment of broadband electronic distribution mechanisms in this country.

The present regulatory environment will force local phone companies to extend broadband capabilities to our homes and cable firms to install voice switching. Not only will this be costly and inefficient, it will considerably slow the spread of access and the development of new information services. By failing to make the important distinction between conduit and content we are unable to recognize the inherent benefits that accrue from separating the two and allowing competition to evolve in distribution mechanisms and information services.

The separation of information services from the particular type of distribution mechanism offering them will allow important use data to emerge on the types of services people actually find necessary for their personal and professional lives. Such data will be crucial in policy settings as we struggle to determine which of these multiple new electronic services are important enough that policies are required for universal access to provide them. We need to better understand what large non-traditional Internet communities find necessary and essential. Allowing connectivity providers to interconnect their infrastructures would accelerate the deployment of broadband capabilities. We can only understand uses better by letting the marketplace provide us with data.

Question 4. *What are the particular obstacles to Internet access faced by potential non-traditional, non-urban Internet users, such as schools, libraries, hospitals, small businesses, and rural residents? What benefits do these groups reap when they become Internet users?*

We have recommended consideration of fiscal incentives as part of our response to question two as a mechanism to accelerate deployment of Internetworking to underserved areas. But while physical access and its accompanying costs may seem daunting to many non-traditional Internet communities, many have suggested that the largest obstacles have to do with adequately training and supporting these communities. Network access and use, like computers, are only tools to be applied to

certain tasks. Knowing what information you want, where it's available if at all on the Internet, and how to access the information service when you need it, are much more difficult tasks for people inexperienced in the use of computers.

Non-traditional Internet communities need to hire or train individuals who are not only experienced in computers and networking but also have specific knowledge and experience of the domains and communities they will be supporting. The worlds of schools, libraries, health care, business, and rural communities are quite different from the resources available in traditional Internet communities. The Internet will continue to remain an undeveloped resource for non-traditional communities unless more than just access is considered.

We applaud Congress' support for funding programs like the Department of Commerce's NTIA which specifically addresses these particular obstacles through pilot projects that will hopefully scale and be transferable to non-traditional Internet communities. We urge you and your colleagues to continue supporting this important initiative. With the Internet market expanding to new communities of interest, the role of reference sites and user support people is critical. Such funding support could require private sector partnerships to help assure ongoing commitment and support.

Summary recommendations

Since an historical review of the technology driven computer and inter-exchange carrier industries suggests that services increase while prices decrease, helping further universal access, FARNET encourages the federal government to adopt regulatory and technical processes to accelerate the affordable growth of separate competitive information distribution mechanisms AND information services.

Towards this goal we specifically recommend the following:

- Support and clearly articulate policies which foster competition in all areas of telecommunication and information technology.
- Prefer network architectures that are all digital and that will scale and be extensible to all locations and user communities.
- Create separate policy frameworks for accelerating the diffusion of distribution channels and content.
- Allow distribution channels to interconnect with other distribution channels to drive technology innovation, speed diffusion, and lower access costs.
- Ensure that networks remain open with standards for interconnection set at both the distributor and user ends, this will exert pressure on proprietary networks such as computer operating systems and network protocols, to either bend to open standards or face market pressures.
- Retain an appreciation for the difference between network access and access to the informational content services that may be paid for separately by use/need/demand. Information service providers will likely want to have their services provided on all distribution means and the de-coupling promotes fair access and focuses the competition not on the conduit provider but on the content and services that are actually desired for their usefulness.
- Consider fiscal offsets/incentives to provide Internet services to underserved areas for a specific period of time - say 5 years. An RFP process could be established seeking bids from local exchange carriers, cable TV firms, wireless providers, and Internet service providers to extend their infrastructure to serve such areas.
- Continue to invest in the public good by supporting networking and network services to America's educational and research institutions.
- Monitor the evolution of the U.S. Internet and stand ready to modify levels and type of support.

FARNET MEMBERS

Ameritech Advanced Data Services
ANS (Advanced Networks and Services)
ASPIN (Arizona State Public Information Network)
A.T. & T.
BARRnet (Bay Area Regional Research Network)
Bellcore
CERFnet (California Educational and Research Foundation Network)
CICNet (Committee on Institutional Cooperation Network)
Cisco Systems, Inc.
Colorado SuperNet
CoREN
Cornell University
CREN (Corporation for Research and Educational Networking)
CSUnet (California State Universities Network)
IREN (Iowa Research and Education Network)
MCI Telecommunications, Inc.
Merit Network, Inc.
Midnet
MOREnet (Missouri Research and Education Network)
MRNet (Minnesota Regional Network)
NC-REN (North Carolina Research and Education Network)
NEARnet (New England Academic and Research Network)
NETCOM
netILLINOIS
NevadaNet
NorthWestNet
NYSERNet (New York State Educational and Research Network)
OARnet (Ohio Academic and Research Network)
PREPnet (Pennsylvania Research and Economic Partnership Network)
PSCnet (Pittsburgh Supercomputer Center Network)
PSInet (Performance Systems International Network)
Sesquinet
Sprint
SURAnet (Southeastern Universities Research Association Network)
VERnet (Virginia Education and Research Network)
Westnet

Mr. BOUCHER. Thank you very much, Mr. Williams.

Mr. Walsh.

Mr. WALSH. Thanks, Mr. Chairman. Almost good afternoon.

My name is Mark Walsh. I'm Chairman of the Interactive Services Association. I am also the President of GEnie Services, which is the consumer interactive service offered by General Electric through its General Electric Information Services Division. I am here today, though, representing the Interactive Services Association, specifically, its 320-plus members, corporations, companies, and organizations that come from areas like the cable, telephone, computer, broadcast, publishing, financial services, travel, advertising, software, audiotext, long distance, and interactive television industries, if in fact interactive television is an industry yet. And I specifically, Mr. Chairman, am probably proof of the growth of this robust consumer business.

In 1986 when I joined what was then known as the online business, at a party it took me one-half an hour minimally to describe what I did for a living. Today, as probably we all know, simply whisper the words "information superhighway" and knowing nods appear. The challenge, though, is whether those nods truly are knowing and whether the information superhighway will provide the benefits we have been told about.

I also am personally convinced that the modem, when looked upon by history in years to come, will be viewed as important as the invention of the Gutenberg press. The modem's ability to disseminate information to the masses affordably is perhaps its most amazing value, and the focus on today's talk and today's discussion, as I understand it, is the word "affordably."

The interactive applications that member companies of the Interactive Services Association represent fall in many areas. Interactive services today, Mr. Chairman, tend to center around four areas for the consumer: Fast changing information like news; communications of an electronic nature e-mail or real time chat or conferencing, transactional services like banking, shopping, travel, reservations; and, lastly, entertainment: games, multiplayer games, movie reviews, and soon movies on demand.

As you have heard, there are almost or perhaps more than 5 million subscribers to PC-based commercial services. They generate three-quarters of a billion dollars in revenue. Our growth rate is over 25 percent a year for the last few years, and let's not forget the over 40,000 consumer-oriented or consumer-run bulletin boards operated by entrepreneurs throughout the U.S.

Secondarily but certainly no less importantly, $600 million in revenue is generated through what are known as audiotext services using the telephone as their platform. And, as I mentioned, we have companies representing the nascent but soon to be explosive interactive television industry, the screen phone industry, which significant American corporations are investing in both on the telephony side and the transactional side, and, lastly, PDA's, personal digital assistants. American consumers access interactive services today from a variety of networks, and, as you may hear me say multiple times, that is the focus of my specific remarks and perhaps my answers to your questions.

For the consumer today in the U.S., the type of network employed is basically irrelevant, what they want is access any time, any place, to the types of services they need at affordable and predictable prices. One of the many benefits to these consumers of the interactive online business that they choose to buy are that these—these services break the boundaries of sex, age, race religion, they bring people of common interests together without geography causing problems.

Online forums exist, for example, for people interested in specific types of computers, software; they help people address personal needs. On GEnie, for instance, we have a forum for romance novel fans and a forum called "Ask the doctor," and people use those forums regularly to great value.

Interactive Services today in the U.S. also empower their users. Online services empower individuals and communities. Tools provided by services that are done by companies in the ISA can act as an extension to the person or the community, compensating for the different abilities, age, or physical health. Electronic grocery shopping, which is starting to grow, can be both a convenience to many and a lifeline to someone who is home bound.

But, Mr. Chairman, as you probably already heard many times today and I would like to echo, as with any new medium, the true benefits are best discovered by the users of the medium and often are benefits that the providers of the services never would have dreamed of. As an example, the movie industry: When the movie camera was first invented, its original purpose was to be placed in front of a stage and film a play. That is what movie cameras were first used for, and, in fact, Alexander Graham Bell himself, after inventing the telephone, suggested that it would be a good way to broadcast music into people's homes.

Consumer commercial online services are available today to only about 80 percent of American households. People in the other 20 percent have to dial long distance to the nearest local service node. The ISA, in its second annual consumer online survey done in May of 1993, posed a bunch of questions on these types of issues on the major consumer online services, and 14,000 users responded.

Some typical responses to the issue we are discussing today are—and I quote—"Costs are too high." "I live in a remote ultra-rural area and have to pay long distance to access the service to have connect fees, and charges for premium services really increases my cost." From another user: "Cost of the service itself is generally reasonable. My biggest cost, choker, is the phone bill." And lastly, "The most frustrating thing about using online services is living in a place that doesn't have a local access number." Our third annual survey covering the same topics due out within a few weeks.

Coming to the Internet, at the close of my remarks I would like to suggest that the public attention that the Internet has received over the last year is almost phenomenal, I think, frankly, unbelievable. There is nothing in the 12-year experience of the ISA or my personal eight-year experience in the business that would even approach it. Most major consumer services—Delphi, GEnie, CompuServe, Prodigy, and America Online—now offer either e-mail access to the Internet or full service access to the Internet. My

company, GEnie, for instance, offers e-mail and will launch full service in 60 days.

But there are two points about the Internet I would like to make prior to beginning of questioning. First, the Internet is just one of many interactive service options available to American consumers and, really, at this stage is only available to consumers with PC's modems and online skills, as you have heard some of the other guests today suggest. It provides a structure for connecting services with the properly-equipped PC users as well as hard-to-use, albeit common, connections between users.

My second point about the Internet is that, given the modest organizational structure that exists for its management and operations, we believe it is unclear how the Internet will evolve as a commercial entity, and this leads to the obvious question about it. Can the Internet or private networks alone provide such local access to rural areas as you have focused today's meeting upon? We contend that it is doubtful that private long-distance networks are likely to provide local interactive services access on their own initiative in the near term. Nonetheless, we would suggest that there are several ways to perhaps encourage that type of investment.

First, from a procedural standpoint, we think it would be useful to know just how many rural PC owners there are today, how many are using some form of online service, and how many are not using online services solely because of cost, and maybe perhaps lastly, how many rural PC owners we project in the future. This information would further help private companies better assess the opportunities to make money by providing such local access.

The ISA believes this Subcommittee and other interested parties should consider two central attributes for future local access success as they encourage both private and perhaps public—private corporations and public corporations to invest. First, predictable pricing, and, secondly, the creation of rural hubs centered at local schools and libraries.

Predictable pricing was perhaps the single most motivational aspect of the growth of consumer online services in the last few years. Virtually every major consumer service available to consumers today has a predictable pricing model that the consumer can, if they stay within several hours of usage per month, know that their bill will remain below. That type of predictable pricing we think is key as Internet access or other network access is made available to the 20 percent of the homes we are suggesting.

Other types of solutions that actually have been echoed in prior testimony today that the ISA would underscore is entrepreneurial support of local node access by individuals and small companies in these rural areas. I, Congressman, lived in rural West Virginia for a number of years near your home, near your area, cold land that it was. I remember small business association loans going out to a number of local entrepreneurs for a wide variety of businesses. And the ISA and my personal suggestion that we might focus on is perhaps reinvigorating the small business model as a way of Government investment to help local entrepreneurs build nodes or build capacity and then bid out that capacity to other network providers like ours and other commercial or Internet providers to tap the households, schools, and libraries.

To summarize, Mr. Chairman, we wish to emphasize that whatever public policy is developed by Federal and State governments to solve this last 20 percent problem of local access, we feel these solutions or whatever policies must facilitate access to all interactive services available today and in the future and not just focus on the Internet. We believe the best long-term solution to local access issues will occur only as a result of a cooperative effort between Federal, State, and local governments and the interactive services industry and the consumers of these services.

On behalf of our 300-plus members, I thank you for the opportunity to make these statements.

[The prepared statement of Mr. Walsh follows:]

WRITTEN TESTIMONY OF MARK WALSH
CHAIRMAN OF THE INTERACTIVE SERVICES ASSOCIATION
Silver Spring, Maryland

BEFORE THE SUBCOMMITTEE ON SCIENCE OF THE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

HEARING ON INTERNET ACCESS

October 4, 1994

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Prepared Statement of Mark Walsh
Chairman of the Interactive Services Association
October 4, 1994

Mr. Chairman, I want to thank you and your colleagues for providing the Interactive Services Association (ISA) with the opportunity to discuss the challenge of enabling all Americans to have local access to the Internet, regardless of where they live. I am Mark Walsh, Chairman of the Interactive Services Association and President of GEnie, the commercial online service of General Electric Information Services, a subsidiary of General Electric Corporation. I appear before you today on behalf of the Interactive Services Association.

As the 12 year old non-profit North American Association serving businesses that deliver telecommunications-based interactive services to consumers, the ISA is very familiar with the extensive challenges of connecting consumers to interactive services. ISA's 300+ members (see Appendix A) represent the full spectrum of industries now active in delivering personal interactive services. ISA's membership includes companies from the cable, telephone, computer, broadcasting, publishing, financial services, travel, marketing and advertising industries. And there are members which are exclusively in the interactive services business and include such companies as online operators, interactive television operators and pay per call service bureaus.

The member organizations of the ISA provide consumers and business users access to a number of interactive services for hands-on use including:

- News
- The Internet
- Education
- Travel Reservations
- Shopping
- Health
- Advertising
- Electronic Mail/Bulletin Boards
- Banking
- PC Hardware/Software Support
- Local Government
- Games and other entertainment
- White and Yellow Page directories
- Services for Senior Citizens and Individuals with Disabilities

As early as 1981 when it was formed, the ISA and its members had a vision that interactive services would be as common to American consumers as broadcast television and the telephone had become. Back in the early 80's, very few Americans

knew anything about interactive services, online communications, or even what a modem was; and of course the Internet was unheard of. In fact it has only been the last two years that extensive public awareness and understanding of our industry has occurred. While important strides have been made for transforming the ISA's vision into reality during the past 12 years, the industry still has a long way to go before our vision is fully realized. But our industry firmly believes that the vision is well on its way to becoming reality.

In my testimony today, I would like to discuss four points with the Subcommittee:

1. An overview of the interactive services marketplace and the special problems rural access has posed,
2. How the Internet fits into the total personal interactive services marketplace and the trend of online services and other companies to interconnect with the Internet,
3. Why it is unlikely that private networks will be providing rural consumers with local access to the Internet or other interactive services in the very near future, and
4. Why public policies supporting 100 percent local access to the Internet should not occur at the exclusion or disadvantage of those interactive services not connected to the Internet.

INTERACTIVE SERVICES IN THE U.S.

During the last decade there has been an explosion of interactive services changing the way Americans are informed, are educated, work and play. And the recent publicity of the Information Superhighway -- emerging high speed networks that will carry voice, video, and data services -- has increased the public's awareness of interactive services and their potential for effecting their own lives as well as their children.

The ISA defines "interactive services" as easy-to-use telecommunications-based services designed for information exchange, communications, transactions, and entertainment. These services today are accessed by a personal computer (PC), telephone, screen telephone, personal assistant, or television and are for personal use, both in the home and the office. Today, the PC with a modem connected to a telephone line is by far the primary way in which consumers access screen-based interactive or online services.

The Interactive Applications

The most popular interactive services fall into four general categories. Consumers look to interactive services to bring them:

1) fast changing information (e.g., news, sports scores, financial services, and directories);
2) electronic communications (e.g., e-mail, real time chat, and conferencing);
3) transactional services (e.g., banking, grocery shopping, travel reservations, and other product shopping); and
4) entertainment (e.g., games - especially multi-user games, horoscopes, movie reviews, and soon movies and other video programs on demand).

The Interactive User Device

Over 5 million subscribers to PC-based commercial consumer online services generate over $750 million annually in subscription, transaction and advertising fees. Subscriber growth has been occurring at a 25 percent or more annual rate for the last few years. Complementing the commercial consumer online services are the 40,000 - plus estimated bulletin boards being operated by companies and entrepreneurs.

And the telephone is the preferred device for millions of consumers generating over $600 million in revenue while accessing a wide range of voice-based information services.

And the method of access for American consumers will diversify even further over time to include the television, screen telephones, and wireless devices. For example, over 300,000 people in Canada and Europe are currently using interactive television services from their homes, and this number will grow significantly as new interactive television systems are introduced in the U.S. during 1995 - 1997. And already millions of Americans are using interactive television in their neighborhood restaurants and bars to play trivia games and interactive television programming for game shows and live sporting events.

Major companies like Citibank, Ameritech. Philips, Northern Telecom and Visa are introducing screen telephones to consumers for banking and other applications.

While only thousands are using such devices today, future years promise steady growth in American homes.

And though the past year has been rocky, no one can give up on the wireless personal assistants. Only last week, AT&T and Sony announced a new personal assistant which will include connection to the AT&T PersonaLink interactive service. Second generation personal assistants from Apple and other manufacturers are expected within a year.

The Networks for Interactivity

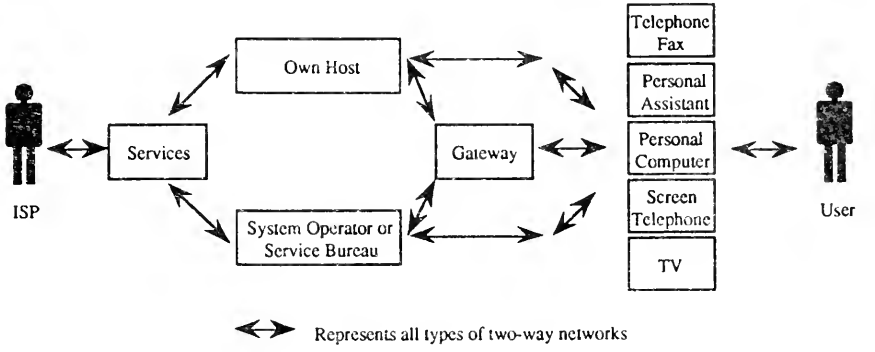
In addition to the variety of devices and the technologies they employ to access interactive services, American consumers also will access interactive services from a variety of networks. While the first ten years of consumer interactive services relied on the regular telephone network, the next decade promises to bring a wide variety of network delivery options including the twisted pair of today's telephone network, the coax of cable, fiber, a wide variety of over the air spectrum, and hybrids of these different approaches.

For the consumer the type of networks employed is irrelevant. Rather, the consumers' interests are that they can rely on the devices they purchase to access at anytime and anyplace the services they need at affordable and predictable prices. However, for the industry during the next few years the type of network is critical to determining the array of services (voice, text, graphics, or video) that can be delivered to the kinds of devices (PC, television, screen telephone, or personal assistant) Americans will be using.

The diagram below broadly represents the current infrastructure for the interactive services marketplace. The ISP, or information and service provider, is the organization or person that develops services which are valued by the consumer. How services eventually reach consumers depends on the type of networks and devices that the ISP is willing to support for its service. For purposes of this infrastructure, online companies such as America Online, GEnie, or Prodigy are considered system operators. The infrastructure also includes all forms of wired and wireless networks that allow two way interaction. Please note that the Internet has

been deliberately omitted from the diagram at this time and will be discussed later in my testimony.

Current Interactive Services Infrastructure



The Benefits to Americans

The ability to access and successfully use a variety of information will increase the productivity and enjoyment of our work, education and entertainment. For example interactive television services will bring entertainment to the fingertips of consumers and will provide video and other programming on demand. Currently, online services enable millions of people to communicate with each other and to access news, weather, sports and financial information through the touch of a keyboard.

One of the many benefits of interactive online services is that they break the boundaries of sex, age, race or religion and that they bring people separated by geography together to share common interests. For example, many current interactive services offer online clubs. People of similar interests exchange information, participate in discussions through public messages, or chat and conference with each other online. Online forums exist, for example, for people interested in specific types of computers, programming, and software. They also exist to help people address personal needs. Forums have been established for senior citizens, people with disabilities, and alcoholics anonymous to name a few.

Another consumer benefit of interactive services is personalization. During the past decade, the business of mass media has been increasingly supplemented by the business of targeted media. From the interactive perspective, direct marketing and mass media promotion are essentially passive approaches. The next generation in targeted marketing are the interactive capabilities that let the users choose - and act upon - the marketing messages they receive. Advertisers are now recognizing this important new development.

But the concept of personalization goes far beyond advertising potential. It means that we will be able to fine tune our information and entertainment profiles, so that the deluge of information -- or junk mail for that matter -- instead is replaced with manageable and welcomed nuggets of information, announcement, and yes, perhaps some promotions too.

Interactive services also empowers their users. Since the beginning of consumer online services in the early 80's, one key fact has emerged and is often overlooked. Beyond the personalization of applications for the individual, online services can also empower individuals and communities. Tools provided by interactive services can act as an extension of the person, compensating for differing abilities related to, for example, age or physical health. Electronic grocery shopping can be both a convenience to many, and a lifeline to someone homebound who is seeking to stay independent. Communities too will experience increasing social and political empowerment through electronic communication, forums, information sharing and collaborative planning. And as services evolve to multimedia presentation, so too will applications tailored to those of us with hearing, speech, sight, mobility or other challenges.

But like with any new medium, the true benefits are best discovered by the users of this medium that the providers of such services would never have dreamed of. However for their full benefits to be realized, interactive services must become more widely available than they are today.

Rural Access to Interactive Services

Mr. Chairman, given your expertise in this area, I am sure you are not surprised to hear that the Internet access problem which is the focus of today's hearing also exists for other interactive services. For example, most consumer commercial online services are only available via a local phone number in approximately 80 percent of the country. People in the other 20 percent have to either dial long distance to the nearest service access node or in some case to an 800 calling service which may or may not have an additional communications surcharge depending on the system operator offering this connection.

I thought you might be interested in hearing some of the comments from online consumers regarding this very issue of rural access. These comments were obtained by the ISA in its Second Annual Consumer Online Survey in which the survey's results were published as a report in May 1993. The survey was posted on major consumer online services, and the users of these services voluntarily took the survey. Nearly 14,000 online users responded to the survey.

> "Costs are too high. I live in a remote, ultra-rural area and have to pay long distance to access the service. To have connect fees and charges for premium services really increases my costs."
>
> "Cost of the service itself is generally reasonable. My biggest cost 'choker' is the phone bill."
>
> "The most frustrating thing about using online services is living in a place that doesn't have a local access number."

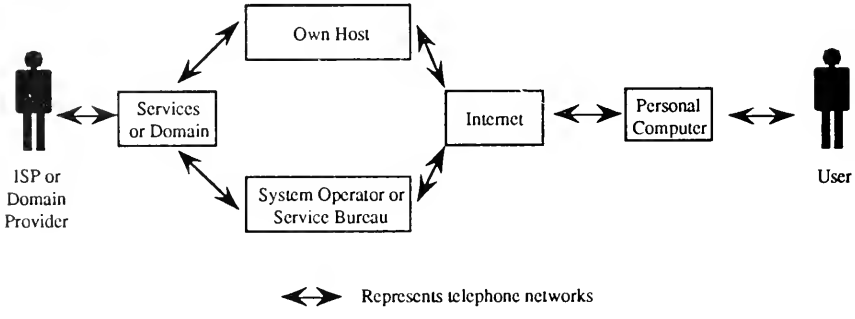
ISA's Third Annual Survey was conducted earlier this year and the final report is expected within the next month. We will then be glad to share with the subcommittee any more comments we may have received from online users about this issue. However, I think it is fairly safe to say that no one today is certain how many rural Americans are able to access online services and are hampered by the long distance costs. But it is a problem, and could likely discourage more rural Americans from using online services than we realize.

THE INTERNET: PART OF THE INTERACTIVE SERVICES FAMILY

The public attention that the Internet has received over the past 12 months has been phenomenal, the likes of which has been rarely seen during the 12 year history of the interactive services industry. Once a home exclusively for academicians, researchers and computer scientists, now Fortune 500 companies and personal computer users are rushing to be connected. The Internet is the place where everyone seemingly wants to be.

And the commercial interactive services industry is no exception. When DELPHI Internet Services announced nearly two years ago that it was providing full Internet access, other consumer commercial services seemed to barely notice. Now all the major services have at least Internet access through e-mail, and are quickly developing full two-way Internet access. The Internet is seen as a great business opportunity by these commercial operators, not as a competitive threat, at least at this point in time.

Basic Internet Infrastructure Today



For the purpose of today's hearing, there are two critical points I want to make about the Internet. First, the Internet is just one of many different interactive services options available to American consumers, and really at this stage only for consumers with PCs, modems, and online skills. Also the Internet is primarily available through

the telephone network. The diagram above is used for illustrative purposes only of the Internet Infrastructure and for comparison with the broader Interactive Services Infrastructure discussed earlier in my testimony. Today the Internet is the de facto gateway of all gateways, but again only for people with personal computers and modems. In other words it provides the structure for connecting services with the properly equipped PC users as well as hard to use, albeit common connection between users.

Second, given the modest organizational structure that exists for the Internet's management and operations, it is unclear how the Internet will evolve as a commercial entity. It could become the primary integrator for all of the interactive platforms, devices, and networks available to users. For example a user of a wireless personal assistant can send a message to a PC user or an interactive television user. Or it can be a network that remains exclusively used for online PC communications via the wired telephone network. Only time, and perhaps political frameworks, will tell how the Internet will evolve to serve people.

CAN PRIVATE NETWORKS SOLVE LOCAL ACCESS FOR THE REMAINING 20 PERCENT?

As mentioned earlier, about 20 percent of the population, those primarily in rural areas, do not currently have access to online information services via a local phone number. This leads to the obvious question: can private networks alone provide such local access to rural areas? Given the history and economics of the still young and evolving interactive services industry, it is doubtful that private, long distance networks are likely to provide local interactive services access on their own initiative in the near term.

Nevertheless, we must work to find affordable solutions to ensure all Americans have comparable access to the benefits that interactive services offer. The ISA offers the following suggestions for your consideration.

First, it would be very useful to know just how many rural PC owners there are today, how many are using some form of online service, how many are not using online services because of cost, and how many rural PC owners there are projected to be in the future. Such market research would help determine current and projected demand

for interactive services and as a result help our country reach the best solutions for rural local access to interactive services given expected demand. This market information would further help private companies better access the business opportunities for providing such local access given the costs of installing a local access node.

Second, we recommend that the local access solution should not be linked to a single technology approach. Consumers and the market should determine the best approaches for access, not the government. Rather, the ISA believes this subcommittee and other interested parties should consider two central attributes for future local access success -- predictable pricing and the creation of rural hubs centered at local schools and libraries.

The experience of the commercial consumer online services demonstrates the importance of predictable pricing to consumers. After such pricing was introduced in the late 80's, consumer subscriber growth in online services rose dramatically and the growth has continued since then. A common example of such pricing is a fixed monthly rate for access to a package of services for a proscribed number of hours a month, with some services providing unlimited hours of access. Predictable pricing will be equally important for rural Americans seeking interactive access to the Information Superhighway.

Ultimately, the marketplace realities of rural local node installation may suggest an interim solution, such as schools and libraries becoming the central rural interactive services hub for a particular community or rural area. The local school and library hub approach will not only allow rural communities to have local access to services, but we also hope such hubs will foster the development of local based interactive information services serving the unique needs of a given community. With more and more carriers, including telephone and cable companies, developing special rates and technologies for schools and libraries, the hub approach to local access shows real promise.

PROVIDING INTERNET LOCAL ACCESS ONLY

Finally, we wish to emphasize that whatever public policies developed by federal and state governments to solve the last 20 percent local access problem, they must

facilitate access to all interactive services available today and in the future, not just the Internet. The Internet is only one part of a much bigger and broader evolving interactive services community, and since it is now supporting significant commercial traffic, the Internet should not be afforded preferential treatment.

Because the ISA represents that broader interactive services industry, and since we agree with the ultimate objective of providing access to interactive services to all Americans, we look forward to working closely with this subcommittee and others in the coming months. Mr. Chairman, to that end and if it would be helpful to the work of the Subcommittee on Science, the ISA would be delighted to survey our own members on the important issues raised by today's hearing and report back to you on our findings at a later date. In addition, we would be happy to work with you and your colleagues to solicit further information on rural access issues by placing a request for such information on the Internet and the commercial online services.

We believe that the best long-term solution to the local access issue will occur only as a result of a cooperative effort between federal, state and local governments, the interactive services industry, and the consumers of such services. On behalf of our 300+ ISA members, I thank you for the opportunity to contribute to the important work of this subcommittee.

Appendix A

Interactive Services Association Corporate Members

101 Online
800 Flowers/Teleway, Inc.
Accu-Weather Inc.
Accurate Info Ltd
Advanced Telecom Services
Aegis Publishing Group
AGT Directory Limited
Air France
Air One Inc.
Aircraft Owners and Pilots Association
Alatalk
Allstate Communications
America Online, Inc.
American Airlines/EAASY SABRE
American Express
American Greetings
American Telnet
Ameritech Development Corporation
APAC Teleservices
Apple Computer
Architel Systems Corporation
Arlen Communications Inc.
Associated Press Information Services
AT&T Consumer Video Services
AT&T Multiquest Services
Audiotex Directory
Audiotex News, Inc.
Bank of America
Bank South
Banker's Trust
BC TEL Advanced Communications
Bell Atlantic
Bellcore
BFD Productions, Inc.
Brite Voice Systems, Inc.
BTT
Budd Larner Gross Rosenbaum Greenberg & Sade
Bureau One Inc.
Cable TV Administration & Marketin
CANNEX Financial Exchanges Limit
Capital Gains Inc.
Cavanagh Associates, Inc.
CD3 Consulting, Inc.
Cellular One
Chase Manhattan Bank, NA
Checkfree Corporation
Chicago Online
Citibank, N.A.
City of Hampton
Cole Group
Columbia University, The Freedom
CommSys Corp.
CompuServe Incorporated
Conduit Communications, Inc.
Conhaim Associates, Inc.
Consumers Union/Consumer Repor
Continental Cablevision
Corporate Performance, Inc.
Courtroom Television Network
CUC International Inc.
CyberMark, Inc.
Dalton Associates
DataTimes
Delphi Internet Services
Dickstein, Shapiro & Morin
Digital Information Group
Direct American Marketers
DirectLink Technologies
DirectoryNet, Inc.
Don Allan Associates of nj, Inc.
Dunnington, Bartholow & Miller
EchoVision, Inc.
EDS - Electronic Commerce Division
EDS Management Consulting Servic

Education On-Line
EON
Etak, Inc.
Everett Multimedia & Design
FBN Software, Inc.
Find/SVP
Fingerhut Corporation
First Data Corporation
First Tennessee Bank
FO'N Consulting
Fonawin Inc.
Ford Motor Company
Forrester Research
FTD Direct Access, Inc.
Fujitsu Cultural Technologies
Future Freedom
Future Systems Incorporated
Gary D. Schulz
Gateway Software, Inc.
General Electric
General Media Worldwide Online Services, Inc.
George Kois
Geoworks
Ginsburg, Feldman & Bress
Globe & Mail
GPT Videotex & Voice Systems
GRAFF Pay-Per-View
GRAFX Group, Inc.
Grey Advertising
Groupe Cerveau, Inc.
GTE Main Street
Hall Dickler Lawlor Kent & Friedman
Hallmark Cards, Inc.
Hawaii INC
Heartland Free-net Incorporated
Heritage Newspapers
Hewlett Packard
Home Box Office (HBO)
Home Shopping Network
Home Shopping Network Products
Honeywell, Inc.
Hong Kong Telecom CSL
Hughes New Venture Organization
ICN Corp & Legacy TV Inc.
ICN Corporation
IDB Communications Group, Inc.
IdealDial
Image Base Videotex Design
Imagetects
ImagiNation Network
IMATEX Communications, Inc.
Info Access Inc
Information & Interactive Services R
Intel Corporation
Interactive Marketing Group Inc.
Interactive Marketing Inc.
Interactive Media Associates
Interactive Media, Inc.
Interactive Multimedia Association
Interactive Network
Interactive Publishing
Interactive Telecommunications
Interactive Transaction Partners (ITP)
Interaxx Television Network, Inc.
Intercor, Inc.
International Coins & Currency, Inc.
International Telemedia Association
Interval Research Corporation
Intuit
ISED Corporation
Issue Dynamics
IT Network, Inc
ITT World Directories
IVI Publishing, Inc.
J. Walter Thompson USA
JCC Technologies, Inc.
John Hall & Company
Jupiter Communications
Landmark Communications-The We
Landmark Networks

Lands' End
Lapin East-West
LIN Broadcasting Corporation
Lincoln Telephone & Telegraph Co.
LINK Resources Corporation
Litle & Company
Lo-Ad Communications
Lochridge & Company
Long Distance Billing Company Inc.
Los Angeles Times
Loto Quebec
MarCole Enterprises, Inc.
Market Information Exchange (MIX)
Marketing & Advertising Services Center
Marketing Corporation of America
MasterCard International
MCI Telecommunications
Media General Inc.
Mellon Bank, NA
Meridian Bank
Metamark International
Metromail Corporation
Michael Wolff & Company, Inc.
Micro Voice Applications Inc.
Microsoft
Midratel US Inc.
Military City Online
Minitel Services Company
Moore Telecommunications
Morris Information Services
MultiComm Development
National Telephone
NBC
Network Telephone Services
New Tech Telemedia
New Times Inc./NTI Communications
New York Switch Corporation
New York University
Newhouse New Media, Inc.
News America New Media
Newsday
NIFTY Corporation
Norpak Corporation
Northern Telecom
Northwest Nevada Telco
NPD Group
NTN Communications, Inc.
NYNEX
Octel Communication
Official Airline Guides, Inc.
Ogilvy & Mather Direct
Online Interactive
Optigon Interactive
OPTIONS Mental Health
Oracle Corporation
Pacific Bell
Pamet River Partners
Pandora Systems International
Parks Associates
Pat Dunbar & Associates
Pay Per Call Ventures
PC Financial Network
PC Flowers Inc.
PC Travel
PeaPod
Philips
Phoenix Newspapers, Inc. (PAFET)
Phone Programs, Inc.
Physicians' Online, Inc.
Prevue Interactive Services
Prodigy Services Co.
ProductView Interactive, Inc.
Pulitzer Publishing Company
QDAT Corporation
Reality Technologies, Inc.
Reuturs New Media, Inc.
Rio Grande Travel
RJ Gordon & Company Inc.
Rosenbluth Travel/Travelmation
Saco River Tel & Tel Co.

San Jose Mercury News
Scholastic Network
SECOM Information System Corp.
Seelinger Communications
SIMBA Communications
Simutronics
SITEL Publication Services
SmartPhone Communications, Inc.
SNET Diversified Group
Southam, Inc.
Southwestern Bell Corp.
Springboard Productions/The Workshop
Sprint Telemedia
St. Clair Interactive Communications
St. Petersburg Times
Star Data Systems Inc.
Star Tribune
Starwave Corporation
Stentor Resource Center Inc.
STM Consulting Pty., Ltd.
Strategic Telemedia
Sullivan Communications
Sure Find Classifieds
Symphony Management Associates Inc.
Talking Classifieds
TDF Groupe France Telecom
Telco Communications Group
Tele-Direct (Pub) Inc.
Tele-Lawyer Inc.
Tele-Publishing Inc.
Telebase Systems
Telecom Finland
Telecompute Corporation
Telemedia Network Inc.
Telemedia Network, Incorporated (TNI)
Teleresults
TELMO rg
Telo Konsult
The Hotel Industry Switch Company
The Infoworks Group
The Kelsev Group
The Marx Group
The Orange County Register(PAFET)
The Promus Hotel
The RAM Group
The WELL
Times Information Services, Inc.
Times Mirror Cable Television
TMA Productions
Tom Lehman & Associates
Tom Morgan
Toronto Star
Trademark Register
TravelFile
Tribune Media Services
TV Alphaville Sistemas de Communi
TV Data Technologies
United Advertising Publications
US Order
US Postal Service
USA Today-Gannett
USAA
UV Corporation
VeriFone, Inc.
VICOM Information Service
Vicorp Interactive Systems, Inc.
Videotex Development Corporation
Videoway Communications Inc.
Village Voice
VIP Communications
Virtual Arts Online Systems, Inc.
Virtual Shopping, Inc.
Virtual Vegas Incorporated
VISA
VISCORP
VISION Integrated Marketing
Visual Services Inc.
Voice FX Corporation
Voice Processing-Infotext
Voicelink Communications

Vos, Gruppo, And Cappel
VRS Billing Systems Inc.
Washington Post Company
Weather Concepts Inc.
Weiss & Weiss
Weissmann Travel Reports
West Interactive Corporation
Working Assets Long Distance
Worldspan
Worldview Systems Corporation
Wunderman Cato Johnson
Ziff-Davis Interactive

Mr. BOUCHER. Thank you very much, Mr. Walsh, and we thank each of the witnesses for their informative statements to us today.

We are obviously very interested in the question of cost. We are very interested in getting some estimate, if it is possible to do that, of the time frame that we are looking at in terms of assuring that in every local calling exchange in the United States there is access to computer data networks using just the local telephone call.

I think Mr. Walsh is right when he says that the true focus is larger than just access to the Internet, it is access to interactive services generally. As Dr. Heiman indicated, he is very interested in getting local calling access to the computer service providers that he presently uses, CompuServe and others, and so the question really is: How do you get local calling access to computer data networks?

Let me ask each of our witnesses if they can make an estimate with respect to this, and Mr. Young and Mr. Clapp in particular, let me ask you this as representatives of Bell Operating Companies, and for purposes of answering the question let's assume that we get relief from the Modification of Final Judgment. I think that is coming. We almost had it this year, and were it not for the other body we would have had it. But let's assume for the purposes of answering the question that some time in the next Congress we repeal the inter-LATA restrictions of the Modification of Final Judgment and allow the seven Bell Operating Companies to offer these and other services across LATA boundaries. Given that assumption, how long do you think it will be before we can realistically anticipate the presence in every local exchange of a node that gives Internet and other computer data network access?

Mr. Young.

Mr. YOUNG. Mr. Chairman, let me approach that in two different ways. First to answer your question—and this is really a guess—I would say it would be around the end of the decade, around the year 2000, before you would see a node in every local area. Now that is just a guess. As I mention in my prepared remarks, we are actively looking at many different solutions to this problem, and we will provide for the record our best thinking on that as we go forward.

But there are a number of issues that have to be resolved in terms of getting the nodes out in every community, and part of the difficulty in making that assessment at this time is that we are at a stage of development of the Internet where things are still changing very dramatically. In fact, on the way here I was trying to think of some analogies to other technologies, and this committee I'm sure is familiar with the high-definition television debate and the excitement that we all had when we saw the MU system from Japan and we thought that was the answer. And then, as we found out, there are other alternatives out there. I think we are still in the beta-VHS stage here.

The software that I use, the Mosaic software, to use the Internet, has changed three times in the last six months. And there are many other solutions to how you get your hands around this large body of data and use it, and so trying to decide how to provide the access—I mentioned that we would like to offer a full Internet serv-

ice, and we are looking hard at that—also determines the type of network that you deploy.

I guess what I am saying here is that we are still looking at this from a number of perspectives. We have a commitment to deploy our broad-band network throughout our region primarily by the end of the decade, and we expect that there will be Internet access along in the same period of time.

Mr. BOUCHER. All right.

Mr. Clapp.

Mr. CLAPP. Let me begin by emphasizing our seriousness in our intention to offer an Internet access service within our five-State area. We are deploying the service within Michigan, and if we are successful in Michigan we will extend that service across the remaining four States.

If we do get relief from the MFJ restriction, that would have a very dramatic effect on our ability to offer the service. We have considerable cost savings.

I think I mentioned in my testimony a 75 percent increase in capital costs and 100 percent increase in expense due to the MFJ, so if that is—if we gain relief, then we will be much more able to offer the service, and the—as this testimony has said, the ability to offer Internet access can be deployed at a relatively or quite small incremental cost. You simply deploy a Sun work station, provide some dial-in capability, and then it is possible to use the existing transmission infrastructure to provide the wider connectivity. So provision of service in areas can be done at a very small incremental cost given the MFJ relief.

Mr. BOUCHER. Let me interrupt at this point to ask questions about precisely that. I noted in your comments that you are planning to provide the Internet access to K-12, community colleges, and libraries. I did not hear you mention, however, the provision of that to residences and businesses as well, and of course one of our primary concerns is getting that kind of dial-up access made available with local phone calls everywhere. Can you talk about Ameritech's plans and how they relate to business and residential access?

Mr. CLAPP. Yes. We are offering the K-12 initiative over our switched data services, which implies a dedicated line to each school or library. We expect that for residences they would want to use a dial-up service, and we are working on that very hard, and we hope to get it out in the first quarter of 1995, probably beginning in Michigan. So we do intend to go forward with that.

Mr. BOUCHER. And this would then provide dial-up access to every resident of the State of Michigan through a local telephone call?

Mr. CLAPP. Not necessarily through a local telephone call because presently we are subject to the MFJ.

Mr. BOUCHER. Well, for purposes of the question let's assume that the MFJ is legislatively overridden, allowing you to offer services across LATA boundaries. Let's make that assumption. Now given that assumption—and I think, by the way—this is not just a hypothetical—I really believe we are going to do that next year. The problems we had, Mr. Williams, with passing the legislation is just that it didn't pass. I mean we had the right answers. We

achieved a vote in the House of 425 to 5 with regard to this measure, so we struck the right balance. There were just some problems in the other body. There often are. But next year I fully anticipate a much better result.

So, Mr. Clapp, let's assume that we are successful and we repeal the inter-LATA reinstructions. Then would we be able to anticipate through your program in the State of Michigan and then potentially later in the balance of your service territory that people in houses and in businesses would be able, through a local telephone call, to gain Internet access?

Mr. CLAPP. We think we could offer this service at a very small incremental cost given that relief. So I think it would be an easy decision to make given success in our current offering.

Mr. BOUCHER. Let's talk then about the costs. As you may be aware, the legislation we passed in the House this year by that vote of 425 to 5 contained a provision that would direct the FCC to initiate an inquiry with regard to whether or not the local exchange industry should be required to provide Internet access through a local telephone call in each exchange. Anticipating that a bit, tell me a little bit about what the costs really are. I'm impressed with your statement, Mr. Clapp, that they really wouldn't be very large, that the equipment costs would be quite small and this could be done without a great deal of difficulty. Can you be more precise about what those costs would be?

Just take your typical local exchange or whatever number of access lines you would like to use for purposes of the example and give us a sense of what the cost of the equipment is and what that might mean in terms of an increased per access line charge. What would it cost?

Mr. CLAPP. Well, first, in the written testimony we did submit an estimate of the cost to provide a minimal access, and we thought a terminal server which had eight ports would cost—eight modems would be $1,600, an eight-port combined terminal server and router would be $2,000, a digital service unit, which is an essential commodity piece of equipment, would be $750, and then transmission facilities—we assume 50 miles to the nearest point of presence of an existing Internet provider; at that point it would be ourselves, we assumed on the order of $300 a month.

This model was built upon the existing regulatory environment. I think the transmission facility costs could be dramatically reduced, but the basic equipment costs would remain the same. That represents approximately $5,000 in equipment costs to enable a central office to offer Internet access, only eight ports, and again that is a minimal provision.

Mr. BOUCHER. When you say eight ports, does that mean that eight users could—

Mr. CLAPP. Eight users may simultaneously dial in.

Mr. BOUCHER. Yes, that is very limited.

Mr. CLAPP. That is very limited. We assumed a community of 1,300 people which are 50 miles away from an existing Internet provider, and this could be grown at a relatively small—again, I don't know the exact numbers—but a small incremental cost to add additional ports as demand was—

Mr. BOUCHER. If you go to 16 ports, the cost doesn't become $10,000, it is some lesser number than that.

Mr. CLAPP. No, it is some lesser number. No. The—we have a per modem cost we estimate at $1,600 for eight modems, and then the routers and the terminal servers would have to be enhanced to handle the additional load.

Mr. BOUCHER. Can you make an estimate of what the cost per access line would be if you provided the equipment with enough ports to serve the anticipated need within a typical community? I realize it is a broad question, and what I am looking for is kind of a ball park figure. But what do you think the cost per line would be to meet the anticipated need? Obviously more than eight, but, you know, whatever number.

Mr. CLAPP. I can't give what I would call a reasoned answer to that right now. We have estimated what our capital costs would be, but we haven't worked it through to a per port cost at this time. We are building a business case in which we attempt to calculate that cost, but it is not yet complete.

Mr. BOUCHER. Well, let me go from the specific back to the general then. Is it your conclusion that if you get MFJ relief, that Ameritech within the entire State of Michigan, within just the next two years or so, could provide dial-up access with a local telephone call to all of the residents of that State?

Mr. CLAPP. I cannot commit for Ameritech. Again, it depends on our success, but, as I said, it is something we would look very seriously at.

Mr. BOUCHER. All right. You are moving in that direction.

Mr. CLAPP. Yes, we are.

Mr. BOUCHER. All right. Very good.

Mr. Young, how about Bell Atlantic?

Mr. YOUNG. As I mentioned before, we are looking very hard at how we are going to do that. I did provide some estimates in my testimony again for a limited type of access based upon the current 6 percent penetration rate of users of PC's with modems who are actually on line. Again, we came up with an estimate of between $1 and $2 million just to serve about 1,000—to have 1,000 ports, which means you would have 1,000 users on at any one time. In Virginia, obviously you would need a much more robust system. We have 1.8 million access lines in Virginia, so we would have to scale that up significantly to provide access to a significant number of people.

Two years might be ambitious, but I think five, if we get MFJ relief and if we could realize other cost savings, I think is a more realistic number.

Mr. BOUCHER. Can you translate those dollar estimates into a charge per access line? In other words, if you just spread it out across your entire user base, how much would that increase the phone bill?

Mr. YOUNG. I don't know. I would be happy to do that and provide it for the record. Again, for the record, since the penetration rate is so low, only 6 percent, one issue that you would face in doing that would be whether the vast body of users would want to absorb that charge.

Mr. BOUCHER. That is an interesting policy question as to whether or not that is fair and equitable, and obviously that is something the FCC would have to look at in this proceeding which is suggested for it.

Is your cost estimate based on the current regulatory environment with MFJ restrictions?

Mr. YOUNG. It is, yes.

Mr. BOUCHER. All right. And obviously the numbers would come down once relief is provided.

Mr. YOUNG. That is correct. We would not require the servers in every LATA.

Mr. BOUCHER. Could you—and I realize it is asking for a lot and you probably have to make a lot of assumptions, but could you provide us in writing with an estimate on a per line basis, in other words, how much the telephone bill would go up for the users in your service territory, assuming MFJ relief and assuming that you place the necessary equipment in your local exchanges to provide a local telephone call dial-up for computer data network access?

Mr. YOUNG. I would be happy to do that.

Mr. BOUCHER. Thank you very much.

I would like to ask Mr. Williams a question that departs somewhat from just this general theme, but he suggested this in his comments, and that is the current effort by the National Science Foundation to move from support of the NSFNET itself to support of users of the NSFNET. Having had association with Merit which has operated the NSFNET, the backbone for the Internet, you would be uniquely familiar with what is happening, and I would be interested in having your comments about the wisdom of the movement that is taking place and any potential problems that you think we might encounter that this subcommittee needs to pay attention to over time.

Mr. WILLIAMS. Well, we are in the middle of a transition, and the current architecture with—where we have a centralized backbone service is going to be gone at the end of April of next year, and Merit and the people that connect to that network are working expeditiously, I think it is safe to say, to move that along. There are a lot of answers. There are a lot of things that we don't know yet about how life is going to be in May of 1995 and how successful that transition is going to be and whether the private sector is going to be able to pick up all the pieces and then glue them back together.

With the NSF backbone, for example, we had a sort of defaults meeting place. We don't have that in the new world, and it is going to require a lot of cooperation by a lot of independent providers to continue the ubiquitous connectivity. That was my reason for suggesting that you continue to watch that.

I am not raising a flag and suggesting it is not going to work or it was the wrong thing to do. Rather, we are in the middle of a transition, and it is important, clearly, for the Internet community that is there and the newer communities that you want to serve that we be successful there.

Mr. BOUCHER. All right.

As an adjunct to the NSF support for users of the research and education network for research and education purposes, what about

the efficacy of an NSF-sponsored program that would provide better low-cost connectivity to the NSF—to the Internet just for general usage, the subject of today's inquiry? That had been discussed as a potential approach by the former panel, and I would like to ask you, Mr. Williams, Mr. Walsh, and Mr. Schrader, if you think there is any role for the Federal Government, whether it be through the NSF or other appropriate agencies, in providing that kind of support and whether that would be a useful step to take.

Mr. WILLIAMS. Well I think it would be a worthwhile endeavor to try and provide some demonstration money with the targets being those areas that are most difficult to serve. I also agree with a number of the panelists that in order to sustain this kind of activity you have got to get community buy-in.

I would also mention, and I think a number of the panelists here would agree with me, some would perhaps disagree, but I think of dial-in or dial-up as sort of the camel's nose in the tent. We need to do that. I live in a rural community, so I get through firsthand experience some of this difficulty.

But dial-up is not—is not going to be the ultimate solution. I continue to be amazed at how much more information you can, in fact, get over modems, but I don't think it is going to allow us to do all the things we want to do, and the digital infrastructure is there. Each of the telephone companies have some very robust digital infrastructure. We play this game where we take an analog signal and turn it digital and then give it back analog to them so that they can transport it when they would really prefer to do it digitally. So down the road I think you may want to reassemble and say okay, now we have accomplished this goal of providing dial-up service using modems and analog circuit, how do we take it to the next step? And I think the telephone companies are aware of that and see that out there on the horizon.

So back to your question, do I think it is worth while for the National Science Foundation to invest money in providing some seed money for dial-up services?

Mr. BOUCHER. Yes, that is the issue.

Mr. WILLIAMS. Yes, I do.

Mr. BOUCHER. All right.

Mr. Walsh.

Mr. WALSH. I would like to take a larger answer and not focus on NSF, but I think I heard your question of Government having a role in motivating this.

I think there are three ways the U.S. Government could motivate increased dial-up access to households. The first is money obviously, and I'll return to that because my second and third are a little more, I think, more specific. The second is with product.

As an example, in 1948 there were 4 million televisions in the United States. Then a show called Milton Berle—Milton Berle was the host—came on. He had an 85 rating, an 85 rating in American television households, and, in fact, some contend that the growth of TV penetration in the U.S. was mostly due to Uncle Miltie and that type of quality product that consumers wanted to purchase.

I would suggest, Mr. Chairman, that the desire to purchase product, interactive content product, on networks will be the driver

from the consumer side that will in many ways cause a robust marketplace that will draw the networks into these rural towns.

Now what is a driver in Manhattan that makes consumers log on to CompuServe or the Internet may very well be quite different than what is a driver in the Fighting Ninth. In fact, I would suggest it would be very, very different, what rural needs are for, be it entertainment of communication or education. But product—and I would suggest the Federal Government can put product up on these networks. The way I, as a public citizen, interact with the Federal Government, the types of information I ask of it, the way I submit information about myself as a taxpayer, as a home buyer, and other types of interactions I have with the Federal Government as a monolith can turn into interactive events that are products, that are sellable and have value because of convenience and perhaps saving me money, and that is my third point.

If the Federal Government would create a structure where the individual consumer is rewarded for interacting with the Government electronically, much like in some cases the IRS does that now for filing your taxes that way, I think then we have my first point, which is money, money from the Federal Government in the form of product. In the interactive consumer business we call it the killer ap, or the killer application. Some potential for a killer ap in rural communities that consumers wanted to buy, some form of reward if consumers behave or submit information about themselves electronically would turn into money that would be—like the rose to the bee, would draw the network into those rural areas and cause that private investment or networking investment that I think is probably the best solution.

Mr. BOUCHER. Thank you.

Mr. Schrader, would you care to comment?

Mr. SCHRADER. With all due respect, my answer is no. I think the Federal Government has played a role. It has completed that role in the seeding of the ARPANet and the NSFNET. If the Chairman and other Members of the Committee and other agencies would like to play a role in the nonproduction environment of the Internet in the future, it would be in studying the outcome, the influence of this brand new, never before seen environment on society in a study sense. You might continue the good work in R&D, which does not include the production networks. But if you fund rural libraries with enough funds to do the job well, they will preempt any three guys in the basement from ever doing anything because they can't compete with free. You cannot compete with free.

If you look at what the telephone companies have done for the last 60 years, they have built the world's best telephone system despite the MFJ. It remains solid, and now they are deployed or have promised to deploy—and I hope they continue to lower their pricing because ISDN pricing is too high—but if those tariffs come down and if they deploy especially with the ISDN anywhere in BA land, this is the service that our customers are buying to gain access to Internet. This is 64 kilobits, relatively low cost, you can do almost anything.

Mr. Williams says that everyone needs broadband. I disagree vehemently. Everyone does not need broadband. We do have broadband in the house today. It is called cable TV. BA and other

telcos are going to be spending billions of dollars to bring us a second cable TV system. I don't even consume the first cable TV system, but then I'm probably unusual, so I'll have to two cable systems, and one of those cable TV systems will carry Internet at very high speed, and I will be doing my electronic mail very rapidly, and I will be doing Mosaic and other things, but that will be in the year 2010, it will not be in 1996.

So what I'm looking at is the damage the U.S. Government and State governments can do and have done against the development of this marketplace.

Let me just take a minute and describe why this is so unique. This is the first time that individuals or small businesses can be the publisher of information. Normally the publication, be it broadcast television or cable TV or newspapers or magazines, are done by people with millions or billions of dollars behind them with FCC approval or some laws that regulate who and what they can say things to. That is no longer the case in the Internet. It has never been the case before in the X.25 world either because the X.25 world didn't really get into the personal marketplace, it was always to businesses.

This is a very unique situation, and it is one that I find exciting. We happen to be here, so I guess I should find it exciting. But it is so unusual that I think you should take care in dabbling in economics. You are dealing with the prime economics of this equation, and I worry about it.

Thank you.

Mr. BOUCHER. Well, that's a very thoughtful response, and I appreciate that comment.

Would you say that other commercial network providers of Internet services would agree with your statement that if the Federal Government launches a program of enhancing connectivity by assuring that a sufficient number of router computers at access points and the like are provided in rural areas to assure that that is done with a local phone call, that that act in itself could materially interfere with progress in the private sector toward achieving those same goals?

Mr. SCHRADER. Yes, 100 percent.

Mr. BOUCHER. That is a good, concise answer. We rarely ever get an answer like that. I'm sorry, I didn't mean to interrupt you.

Mr. SCHRADER. Well, I have to elaborate.

Mr. BOUCHER. Please do.

Mr. SCHRADER. I hate to speak for everyone, but anybody that is commercial—you defined it as commercial, which means we are not applying for Federal grants, so some of Jim's members in FARNET—we are a member—apply for Federal grants. They will say, yes, we want those Federal grants, because then they will be subsidized to compete against us if you define it as commercial. Those three guys in their garage or the 130 in our garage that are working on this, we will ask you with great respect to remember that we are in the America and this is a capitalist society and I'm a capitalist.

Mr. BOUCHER. Let me ask you this question. How does it interfere with you if what is provided at public expense or partially at public expense is a greater number of access nodes through which

more people could connect with your on-line service by just paying a local telephone call? Why would that not have the effect of expanding a customer base for you rather than contracting one?

Mr. SCHRADER. That is a good question. The answer is a little, slightly convoluted. So by definition all of the network providers control all of the access to their network. I own every modem. I mean our company owns every modem. GEIS owns all of their computers, and I think—I don't want to speak for them, but they may use some other carriers to get to there, but they actually have agreements that are—that money moves whenever you use somebody else's modem.

So what you are imagining here is that you are creating a new entity. If we choose to use those modems, we have to pay for the access to those modems, and now we have a quality control question. So there is cost and quality control.

We have made a determination, simply our business, that we don't want to use other people's modems, we want to use our own. So when we enter the two cities that these two fellows will enter at their cost, we will come in at a much higher cost because we never open with eight modems, we come in with 23, which is a full bank of ISDN modems, and that cost is $25,000 minimum, and sometimes it goes to $50,000, and in a larger city it is close to $200,000. These costs are inclusive of the rest of the business which includes labor and travel and rental of space and advertising. They are not giving you those answers.

So if you go in and actually do this and the library is free to act and compete with the local telephone—you see, the local libraries, let's say in Morrisville, we don't have a POP in Morrisville, but if you put a POP in Morrisville that was owned by someone else, Sprint, then Sprint will have an advantage over us. So you won't pick Sprint, you'll pick a not-for-profit entity, and that not-for-profit entity would then choose to buy service from Sprint or from us. We will, on our own business style, not buy—not get involved in that, but there are many other businesses that may, and again you are dabbling there.

Now Morrisville has access to the Internet through us. They can serve the local community.

Mr. BOUCHER. Okay. Well, I think you have provided an adequate answer.

Let me just ask one technical question in concluding this, and unfortunately I'm called elsewhere at the moment. Bell Atlantic I know is leading the Nation in terms of the deployment of ISDN technology in the local exchange. I think you have the distinction, Mr. Young, of being well ahead of most of the rest industry and now have—or have immediate plans to deploy it through something like 90 percent of the your network. Is that accurate?

Mr. YOUNG. That is correct.

Mr. BOUCHER. This, however, doesn't solve the entire problem that we are focusing on today because the mere availability of the ISDN technology offers a higher quality of connection, a digital connection, but still does not avoid the need to obtain access to the Internet itself, and that may in fact require a long-distance telephone call. So while it will clearly affect the quality of the connec-

tion it does not affect the cost of it ultimately for people in rural areas. Is that correct as well?

Mr. YOUNG. That is correct.

Mr. BOUCHER. All right. That is good.

Well, I want to thank everyone for being with us today. This has been a very useful session. I think we have learned a lot about the problem. I'm not sure that we have any sense of what role, if any, the Government should play in fostering the solution, but I'll say that for my own part I am very encouraged to hear that the local exchange industry is aware of the problem, that at least in the case of Ameritech there is a plan for dealing with it. And Mr. Clapp I appreciate your perhaps optimistic prediction that within a couple of years you will have the problem solved in one State and then maybe based on that experience we can evaluate that success and see what needs to be done in terms of expanding that experience to the rest of the country.

It was a very helpful presentation this morning, and with this Subcommittee's thanks this panel is excused and the hearing is adjourned.

[Whereupon, at 12:19 p.m., the Subcommittee was adjourned.]

APPENDIX

BOB WISE
2D DISTRICT, WEST VIRGINIA

COMMITTEES
COMMITTEE ON THE BUDGET
COMMITTEE ON
PUBLIC WORKS AND
TRANSPORTATION
CHAIRMAN, SUBCOMMITTEE
ON ECONOMIC DEVELOPMENT

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STATEMENT OF CONGRESSMAN BOB WISE
OF WEST VIRGINIA
BEFORE THE SUBCOMMITTEE ON SCIENCE
OF THE HOUSE SCIENCE, SPACE AND TECHNOLOGY COMMITTEE

OCTOBER 4, 1994

Mr. Chairman, Members of the Subcommittee, I want to thank you for the opportunity to submit written testimony on the problems rural areas have in accessing what has come to be commonly known as the information superhighway. I know you have received a considerable amount of testimony to date so I will keep my remarks brief and to the point.

It is amazing what types of information and services are available at our fingertips. By connecting to the Internet via modem, individuals all over the world can access information that would take weeks or months to gather "manually." This is especially important and advantageous in rural areas -- areas that don't have large libraries or other cultural facilities. It levels the playing field providing affordable access to information and communications -- almost.

Unfortunately, while the cost of actually accessing and using the Internet is relatively low, users in rural or remote areas must also pay charges for long distance toll calls to connect their computers to the Internet. This has the effect of placing an economic barrier on the information superhighway.

I have been contacted by constituents who have businesses in the Eastern Panhandle of West Virginia. This area is only an hour's drive from Washington, D.C.; yet there is no local phone access to an Internet node for these constituents. This has two consequences. First, it makes it more costly for individuals to link up and use the services available; second, and more significantly, it has the effect of deterring economic development in these areas. In West Virginia we have some of the best telecommunications infrastructure in the nation. However, having to connect this infrastructure to the Internet through a toll call is a disadvantage that outweighs the positive factors.

Mr. Chairman, I commend you for bringing this issue up for discussion in search of easier access for constituents in areas like the ones you and I represent. I am hopeful that forums like this one will lead to better access and equal affordability for smaller communities who venture onto the superhighway. It is vital if we are to remain competitive for economic development opportunities. As we near the end of this century, we face different challenges. I feel confident that your leadership on issues like this one will serve us well into the future.

SCHOOL OF INFORMATION STUDIES

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Statement of

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For the

U.S. Congress, House of Representatives
Committee on Science Space and Technology
Subcommittee on Science

October 4, 1994

Hearings on Internet Access

PUBLIC ACCESS TO THE INFORMATION SUPERHIGHWAY THROUGH THE NATION'S LIBRARIES

My name is Charles R. McClure and I am Distinguished Professor of Information Studies at Syracuse University, School of Information Studies. I teach courses in information resources management, federal information policy, and the planning and evaluation of library/information services. In recent years I have conducted a number of studies related to the Internet, the National Research and Education Network (NREN) and the evolving National Information Infrastructure (NII). Attachment A contains additional biographical information and background.

I appreciate the opportunity to provide this statement and regret that due to schedule conflicts I was unable to testify in person. I commend the work of its Chairperson, the committee, and its staff in promoting public debate regarding access, use, and impacts of the Internet. The subcommittee's track record of hearings on topics related to development of the NII, high performance computing, and access to and use of the Internet provide an excellent background for the hearings being held today (for example, Congress, 1993a; Congress 1993b).

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The roles of libraries in providing access to the Internet are still evolving, but such roles raise policy issues that are both significant and complex. Indeed, there has been limited formal investigation and policy research supported by federal agencies regarding these topics -- much more needs to be done. Research being done in this area by a study team at Syracuse University, School of Information Studies does offer, however, a number of findings and recommendations related to libraries and increasing the public's access to the Information Superhighway.

Congress can take a much more active stance in supporting and coordinating policy and program support to enhance the role of libraries in providing public access to the Internet. There are a number of themes that I would like to stress in my statement:

- Access to and use of the Internet is a tool which empowers its users and provides numerous benefits for individuals, communities, and society at large; libraries can serve both as a place of first resort -- a community Internet resource center -- and a place of last resort -- a safety net -- in providing public access to the Internet for the Nation's citizens.

- Library access to and use of the Internet varies widely based on geographic location, type of library, user characteristics, technical infrastructure available, and a range of other factors. A flexible and dynamic policy system is needed to respond to these different access needs.

- Market forces, alone, will not provide equal access to the Internet and many public institutions such as schools, libraries, hospitals, without help, will encounter too many barriers to successfully realize the full potential of the resources and services available over the Internet.

- Partnerships among and between the federal government, the library community, information providers, local and state governments, and other institutions/organizations are essential for increasing access to the Internet.

- The federal government has an important role to play in developing a framework for both policies and programs that supports libraries, and other organizations, which can then provide "equal opportunity" to access and use the Internet.

Libraries are especially well-suited to advance the national objectives for the Information Superhighway identified by Congress and the administration. They are currently breaking a trail for the public's access to and use of the Internet, largely

from limited resources and in a poorly defined federal policy environment. Much can be done to enhance libraries' role in the Information Superhighway so that the citizenry of this country can be empowered in both their professional and personal lives.

This statement provides background to the issues being discussed at this hearing; reviews research results from recent studies conducted at Syracuse University; identifies and describes key issues requiring Congressional attention; and concludes with a number of specific recommendations for Congress to consider related to increasing access to the Internet.

BACKGROUND

President Clinton said in the State the Union Address of January 25, 1994 that "we must work with the private sector to connect every classroom, every clinic, every library [and] every hospital in America into the national information superhighway by the year 2000" (Clinton, 1994, p. 1). The development of the National Information Infrastructure (NII), and the Clinton administration's support for this effort offer the promise of a communications revolution that will affect the very fabric of our society. The National Information Infrastructure: An Agenda for Action (Information Infrastructure Task Force, September, 1993) outlines a view for what the NII might become and describes the Administration's view of principles and objectives that will direct this effort.

In addition, the Information Infrastructure Task Force (IITF) Committee on Applications and Technology noted in a January 25, 1994 policy document (1994a, p. 3), that libraries are one of seven major application areas for initial study, and:

> Providing equitable access is important for many of the applications areas considered. This issue includes access to other individuals and citizen groups via the NII as well as access to information.... For education and for libraries, all teachers and students in K-12 schools and all public libraries -- whether in urban suburban, or rural areas; whether in rich or in poor neighborhoods -- need access to the educational and library services carried on the NII. All commercial establishments and all workers must have equal access to the opportunities for electronic commerce and telecommuting provided by the NII. Finally, all citizens must have equal access to government services provided over the NII.

This policy position -- one that has been supported by this Subcommittee in HR 1757 -- is a key component of the National Information Infrastructure (NII) initiative.

Most recently, the Information Infrastructure Task Force, Committee on Applications and Technology stated that one of the National visions for the NII was to "sustain the role of libraries as agents of democratic and equal access to information" (1994b, p. 1). How these roles evolve, how the private sector, state and local governments, the education community, and libraries can work together to realize these visions, and determining the federal role in promoting these visions are critical concerns. Indeed, the importance of public access to electronic information in a networked environment cannot be underestimated.

Connecting libraries to the NII, in and of itself, may not be the most difficult problem to address -- although it certainly will require careful thought and consideration. Equally important are issues of who will have what type of access to the NII, how to pay for the costs associated with using the network, educating the public on how to use the NII, and developing a range of applications and uses that promote network literacy and enhance our educational system. An understanding of the policy issues affecting the use of the NII and a clarification of the policies that will be needed to promote the use and impact of the NII are needed *in addition to* providing connectivity.

The National Information Infrastructure Act of 1993 (H.R. 1757), which was introduced by this Subcommittee, offers more specific language regarding the role of libraries. Section 305 (b) of H.R. 1757 states that the program will:

> Train teachers, students, librarians, and state and local government personnel in the use of computer networks and the Internet. Training programs for librarians shall be designed to provide skills and training materials needed by librarians to instruct the public in the use of hardware and software for accessing and using computer networks and the Internet.

This bill is important since it includes language supporting universal service, extending the role of libraries and the education community in developing and operating the national network, and promoting the development of networking applications and demonstration projects.

Aspects of H.R. 1757 have (as of August, 1994) been incorporated in S.4, The National Competitiveness Act, which includes a number of national networking initiatives. In addition, H.R. 3636, The National Communications Competition and Information Act, discusses objectives related to connecting libraries to the NII. But how these objectives might be accomplished, what the role of the federal government might be, and how, specifically, librarians might "instruct the public" are unclear at best.

Comprehensive telecommunications reform, however, will not occur in the 103rd Congress. In a statement issued September 23, 1994, Senator Hollings said "the lead co-sponsors of the bill [S. 1822] and I have come to an agreement that there is simply not enough time left in the session to overcome . . . opposition. We are confident that we will be able to take up comprehensive communications reform early next year." Thus, the visions for reform will continue to evolve and be debated in the next Congress.

But as these policy visions for promoting access to and use of the Internet via continue to grow and evolve, there has been an ongoing, and serious, erosion of support for libraries to accomplish the Government's existing policy goals in this area. Congressional action to coordinate policy, program, and research and development initiatives that support library-related efforts that enhance public access to the Internet is needed.

FINDINGS FROM RECENT STUDIES

During the past two years I have led a number of study teams at Syracuse University, School of Information Studies that have been involved in research specifically investigating issues related to the role of libraries in the evolving Internet/NII. These studies include:

- Libraries and the Internet/NREN: Perspectives, Issues, and Challenges (McClure, et. al. 1994a). This book reports on studies related to how different types of libraries are using the Internet and identifies key factors that promote success in developing networked-based library services. The research was funded, in part, by OCLC, Inc., and Mecklermedia Publishers.

- Connecting Rural Public Libraries to the Internet: The Project GAIN Report (McClure, et. al. 1994b). This study, reports on the results of connecting rural public libraries to the Internet and identifies impacts that resulted from having these connections. The research was funded, in part, by NyserNet, the Kaplan Foundation, and Apple Computer Corporation.

- Public Libraries and the Internet: Study Results, Policy Issues, and Recommendations (McClure, et. al., 1994c). This report offers the first national survey data describing public libraries' use and connectivity with the Internet. This survey was funded by the National Commission on Libraries and Information Science,

Copies of these studies have been made available to staff of the Subcommittee. I believe it is important to highlight the following findings from this work.

Limited Connectivity and Public Access

While it can be argued that public library connectivity to the Internet is increasing, only 20% of the Nation's public libraries have some type of connection to the Internet. Further, in only 9% of the public libraries can the public use the connection directly to access information resources and services on the Internet. The vast majority of public libraries and users of those libraries are unable to access the Internet and its information resources and services. Further, a library may have a connection to the Internet but has not obtained adequate training in how to use the connection to enhance its information services to its community.

Data from the study also show that those libraries with connections are using unsophisticated equipment and software. Many libraries that are "connected" have only e-mail capability and are unable to transfer large files, search remote databases, or use new resource discovery tools such as Mosaic. Thus, having a connection does not necessarily equate to that library being able to provide a range of Internet-based services and resources.

Significant Disparities

Some 79% of the Nation's urban libraries (serving populations of 250,000 or more) have some type of connection to the Internet while only 17% of rural libraries (serving populations of 25,000 or less) are connected. In the Nation's Western states, for example, 28% of the public libraries are connected, but in the MidWest, only 15% have connections. Different reasons and barriers can be offered for why such disparities exist -- but it is important to recognize that currently, these disparities do exist.

Additional disparities occur in terms of the amount of resources that are being committed to Internet services by public libraries. Urban libraries are spending, and intend to continue to spend, more on Internet services than their rural counterparts. These findings suggest that the gulf between the "Internet Have" versus "Internet Have-not" public libraries, which already exist, may continue to widen in the future. One cannot conclude, however, that because urban libraries spend more than rural libraries on Internet services that either spends *adequate* resources on such activities.

These findings should *not* be interpreted to mean that urban libraries have solved problems related to obtaining and providing Internet access to their communities. The data suggest that *relatively speaking*, more urban libraries than rural libraries are connected; neither provide much public access to the Internet; and overall, public libraries of both types are unable to commit adequate resources to providing Internet-based services.

Barriers Limiting Access to and Use of the Internet

It is difficult to single out particular barriers that are limiting public library use of the Internet. In fact, a combination of barriers typically affect the library depending on the library's particular circumstances. Our research finds the following factors to be influential in affecting public library involvement in the Internet:

- Costs of connectivity including ongoing telecommunications costs
- Costs to obtain the necessary hardware and software
- Library staff's awareness and knowledge of the Internet
- Lack of internal library technical expertise to identify an appropriate provider, utilize the new computer/telecommunications technologies, and obtain and maintain connectivity
- Level of community interest in having Internet connectivity via the public library
- Level of the library governing board's interest in having Internet connectivity via the public library.

For many rural public libraries, the single most important barrier hindering Internet access may be obtaining an affordable telecommunications link. Project GAIN findings identified wide discrepancies among providers for costs to rural libraries to connect to the Internet. And, costs for *getting* connected differ from costs for *staying* connected to the Internet. For a number of other types of libraries, the key barrier may be the library's management and/or staff's lack of knowledge and/or interest in the Internet.

Inadequate Resource Support

The amount of resources being spent on Internet services by public libraries varies considerably by type and location of library. On average, however, in 1993, public libraries reported an average of $1,591 spent on Internet-related activities per library -- of which only 5.6%, on average, came from federal sources. Multiplying

this number by the number of public libraries in the Nation, 9,050, generates a *guesstimate* of $14,398,550 for total expenditures on Internet-based services through public libraries. Clearly, this amount of resource expenditure is inadequate to accomplish policy goals expressed by Congress and the Executive branch.

In Project Gain, the rural libraries received an initial start-up of equipment valued at approximately $6,000. Additional support from information providers such as OCLC, NyserNet, and a number of publishers of training guides, resulting in an additional pro-rated contribution of some $13,000. Thus, the initial cost for providing start-up computing equipment, connectivity, training, and other types of support was $19,000 per site (McClure et. al., 1994b, pp. 5-7). Costs can be reduced with lower quality equipment and support, but Project Gain shows that *start up* costs of $8,000 - $10,000 are reasonable estimates for equipment, connections, and support for the public library to begin using the Internet.

Despite limited resources, some state libraries have been quite successful in building state-wide networks that support public library access to the Internet. Indeed, one of the most important motivations for many public libraries to get connected to the Internet was the availability of such statewide networks -- especially in rural areas. States such as Maryland and North Carolina (to name a few) have been able to leverage both state resources and oftentimes resources from the Library Services and Construction Act (LSCA) to connect public libraries to the Internet. But overall, the resources available -- at both the local, state, and federal levels, are inadequate for the policy goals at hand.

Significant Impacts Resulting from Connectivity

In those libraries where connectivity to the Internet has occurred, where the library has adequate equipment and can afford the telecommunications charges, and where the staff have been trained in the use and applications of the Internet, there have been significant impacts and benefits. These benefits touch on local economic development, collaboration with local schools, improved learning and interest among students and community members in computing, better delivery of governmental services, and much more (McClure, et. al. 1994b). Other members of this panel will describe these impacts in greater detail.

The evidence from Project GAIN, which I evaluated, shows clearly that rural public librarians, when they have adequate hardware, software, a reliable connection to the Internet, and are trained, will use these resources and will have significant impacts in their community. These impacts typically fall under the headers of:

- Empowering individuals by training or retraining them in uses of new information technologies
- Increasing the global perspectives of community members by connecting them to virtual, geographically dispersed communities around the world.
- Promoting the economic development of the community
- Providing for enhanced local educational infrastructures
- Introducing new information technologies to the local community
- Leveraging the information infrastructure with other institutions to otherwise benefit the community.

Additional detail on these and other impacts are described in our studies. But it is clear that a number of public and academic libraries have had significant impacts on their local communities by establishing Internet-based services.

Formal impact assessments of how Internet use affects local communities. libraries, individuals, and democratic institutions have yet to be done. Federal agencies, such as the National Science Foundation, have spent huge sums on supporting the Internet's technical infrastructure development. But there has been, relatively speaking, very little research support for identifying and measuring impacts resulting from use of the Internet.

KEY ISSUES

Overall, the results from these recent studies suggest that while public libraries are making progress in both being connected and providing Internet-based services to the public, there is much distance yet to travel before the Congress' and Administration's policy goals will be accomplished. A number of the issues that need to be addressed are discussed in length in the studies we have completed. I believe, however, that it is important to highlight some of the issues here.

Clarifying Policy Goals

As previously noted, President Clinton stated that "we must work with the private sector to connect every classroom, every clinic, every library, and every hospital in American to a national information superhighway by the year 2000." How this goal will be accomplished, which federal agencies will provide leadership, and what resources will be committed to realization of the goal is unclear. Throughout a number of these policy statements is an assumed belief that the market, by itself, will work to insure that such connections occur. Numerous examples can be provided where "market forces" do not contribute to connecting schools and libraries.

The President's statement that "we must work with the private sector" to accomplish such goals is laudable but problematic. Clearly, the private sector has been successful in building the national information infrastructure to support the development of the Internet and the evolving NII. Indeed, individual providers can point to specific projects where they have subsidized connecting public sector institutions such as libraries and schools to the Internet. While such efforts are laudable, I do not believe it is the responsibility of these providers to bear all the costs for connecting these public institutions.

Further, the focus on connectivity is fleeting at best. Obtaining a connection to the Internet is "necessary but not sufficient" in the provision of networked-based services. Representative Boucher should be congratulated for the language he proposed in HR 1757 which recognized the need for training and additional types of support for public institutions to provide useful Internet-based services. To what degree does the private sector also have a role in providing training, instructional materials, and other kinds of direct support to public institutions *after* the connectivity has been accomplished?

Public access to the Internet via the Nation's highways is a public good which may require direct support from federal, state, and local governments. Libraries will need support for connectivity, equipment, and training to serve in this role. The federal government can serve in a number of ways to support this role:

- Broker/arbiter: bring together the various stakeholders needed to promote libraries' provision of public access to the Internet.

- Stimulator/experimenter: stimulate on a demonstration basis best practice examples of ways to meet library and community needs in accessing the Internet.

- Guarantor: insure that public access to the Internet through the Nation's libraries, as a public good, is being met.

- Evaluator: assess the successes of various federal programs to identify which efforts should continue to be supported or what new programs are needed.

- Policy Leader: craft the vision, develop policies, and support programs necessary to insure public access to the Internet.

Answers for promoting public access to the Internet and clarifying the roles of libraries in this process will not come from any one segment of society. Rather, the library community, government officials (federal, state, and local), private sector firms, and others must work together -- a key federal role is to encourage such partnering.

Clarifying Library Roles

As a statement of National policy, libraries should be identified as the place of first resort to obtain information, training, and connections to the Internet -- to take advantage of sophisticated new information technologies -- and as a place of last resort, a safety net, where the public can be assured that they have both access to Internet-based information and services, and where they can obtain professional assistance in identifying, locating, and obtaining those resources and services.

The federal government has gone on record that the public deserves better access to and management of electronic government information (National Performance Review, 1993). As a statement of National policy, libraries should serve as the place of last resort where the public can be assured that they have both access to government information as well as obtaining professional assistance in identifying, locating, and using that information as outlined in a recent Office of Technology Assessment report (1993).

The statement that libraries should be *connected* to the information superhighway by the year 2000 begs other issues related to (1) how that connectivity would occur, (2) what benefits such connectivity would provide for the Nation, (3) the degree to which the private sector will directly support such library connectivity and use, and (4) clarifying National roles and priorities for libraries in this networked environment. Additional debate and research will be necessary to answer such questions and encourage partnerships between libraries and the private sector.

The federal government can, as it has done with the development of National educational goals (e.g., "Goals 2000," PL 103-227) state National goals for public access to the Internet. Such goals should describe the role of libraries as outlined above and recognize the importance of promoting information literacy through these libraries and affirm, as public policy, that the provision of public access to the Internet via the Nation's libraries is a public good.

Role of the Private Sector

While the information providers in the private sector certainly can assist the public sector, and especially the library community, to be connected and support public access to the information superhighway, they are not, ultimately responsible for ensuring public access. Ultimately, the Government must be responsible for promoting the "the public good" and insuring that public goods, such as the Information Superhighway, are equally accessible and usable by the public.

Despite the good intentions of some providers, such as Bell Atlantic's support for the Blacksburg electronic village, "enlightened self-interest" alone will not provide sufficient incentives for providers to connect public institutions such as libraries and schools to the information superhighway. Increased competition, meaningful incentives, and a policy and regulatory playing field such as that proposed in S. 1822 can encourage and support private sector initiatives to increase public access to the Information Superhighway.

The primary role of the network providers is to build and maintain a reliable and effective information infrastructure. It is the Government's role to develop policies and establish regulations to promote public access or "universal service." Language such as that in S. 1822 that requires all telecommunications carriers to contribute to a universal service fund which would be administered by the FCC and the states to promote "universal service," is an example of how the Government can "encourage" the private sector to promote public access to the Internet.

The practice of network providers' "cherry picking" profitable network services and geographic locations is detrimental to the policy goals of the Government regarding "equal access to information" (Information Infrastructure Task Force, 1994b, p. 1). A regulatory environment that (1) encourages competition among providers, (2) provides reasonable guidelines for pricing networked-based services, (3) encourages partnerships among the various stakeholders, and (4) re-directs some earnings from profitable services to those that are not profitable, but contribute to the public good, is essential.

What is Universal Service?

Debate should continue to determine what the National policy goals might be regarding universal service in the age of the Information Superhighway. The recent request for comments from the National Telecommunications and Information Administration on this topic, for example, should expand and define this debate (National Telecommunications and Information Administration, 1994a). I would propose, however, that universal service is not, as one provider recently confided to me, "if you've got the money, we've got the service." Indeed, it may be useful to distinguish between universal access to, and universal services from, the information superhighway.

Universal access to the information superhighway implies equal and reasonable opportunity for the individual to be connected to the Internet. But to be "connected to the Information Superhighway," the individual must, minimally:

- Own the necessary computer and telecommunications equipment or have access to it
- Have direct and affordable access to high bandwidth telecommunications link into the information superhighway
- Be knowledgeable enough about the network to use it or be able to obtain assistance from someone who has such knowledge.

That connection may be at home, the office, or at some public institution. The notion here is that regardless of physical location or demographic characteristics, the individual may, if he or she chooses, obtain access to the Internet. But having access to the Internet without knowledge of how to use the Internet is not very useful.

The notion of universal *service*, however, implies some baseline or minimal level of Internet services to which the federal government assures the public it can access and use. For example, the government could assure the public that they are entitled to, minimally, professional assistance in how to use the information superhighway and obtain basic government services via the superhighway.

Existing policy definitions of universal service in S. 1822 are good first steps, but they tend to offer supply side views of universal service rather than demand side (or user-based perspectives). They fail to differentiate between requirements for first providing access, and then, determining what, if any, services should be made

universally available. Furthermore, they often fail to recognize that providing access, say a T1 line to the front door of an elementary school, may still not provide connectivity nor any services into the school because there is insufficient local knowledge as to what to do with that line. Connection to the door does not guarantee effective use of Internet services by the students. National goals related to "connectivity" alone may be short-sighted.

Network Literacy

The skills required to use the "switch hook flash" on one's telephone pale in comparison to the skills and knowledge that are needed to use resources and services on the Information Superhighway. The vast majority of the public has no skills related to using these new communications technologies. Network literacy, the ability to identify, access, and use electronic information from the Information Superhighway and the evolving NII, will be a critical skill for tomorrow's citizens if they wish to be productive and effective in both their personal and professional lives (McClure, 1993).

There is an educational disconnect between the rapidly developing communications technologies and information resources available to the public, and the public's ability to use these resources. An elite few, typically academics, researchers, technology enthusiasts, and "network junkies," are network literate. The September, 1994 issue of PC World (p. 30), reported that households with incomes of $50,000 or more are five times more likely to own a PC and 10 times more likely to have access to online services. In a survey of college graduates with children, 49% had PCs, compared to 17% of homes in which the parents had only high school diplomas.

Preliminary data from the Bureau of the Census, with the assistance of the Center for Community Networking supports these findings and offers additional insights as to the demographics of who does and does not have access to home computing and online services (Civille, 1994). The gulf between the network literate and those who are not continues to widen.

Will the networked society result in excluding a range of services and opportunities to those who are unable, for whatever reason, to move to the networked environment? Who will be responsible for educating people to use the networking technologies and take advantage of the wealth of resources currently available and yet to be developed? How will the public participate in decision making about technology applications that will affect the fabric of their society if they are network illiterate?

How we address and resolve these issues will have a significant impact on how society evolves, how notions of literacy and a literate society evolve, and the degree to which social equity can be enhanced in the United States. The country must develop strategies to develop the Information Superhighway as a vehicle for (1) "reconnecting" different segments in our society, (2) promoting a network literate population to ensure a social equity, and (3) enhancing the role of libraries and the education community to accomplish these objectives.

Uncoordinated Federal Support to Libraries

Increasingly, the list of agencies and their responsibilities vis a vis support for libraries to provide Internet-based services is unwieldy and complex. Key federal players in this arena include (but are not limited to):

- The National Telecommunications and Information Administration (NTIA): currently administers a $26 million program "Telecommunications and Information Infrastructure Assistance Program" (TIIAP) which offers competitive grants for public projects related to Internet development -- some of which may support libraries.

- The Department of Education (DOE): has a raft of programs and services that could support libraries' development onto the Internet; these result from the Library Services and Construction Act (LSCA), the Elementary School Education Act (ESEA), and the Higher Education Act (HEA) -- to name but a few.

- The National Aeronautics and Space Administration (NASA): recently awarded $20 million to 15 organizations to develop technology and applications for putting earth science data on the Internet.

- The National Science Foundation (NSF): offers a large number of programs, most recently awarding some $25 million for their digital libraries projects, from which libraries might apply for grants and awards to promote the development of Internet services.

- The Government Printing Office (GPO): in its administration of the Depository Library Program, supports the dissemination of electronic government information to some 1400 libraries.

In addition, other federal agencies have developed programs intended to support libraries' access to and use of electronic information such as the National Technical Information Service's (NTIS) FedWorld. The national libraries -- the Library of Congress, the National Library of Medicine, and the National Agriculture Library -- have programs and roles in this area. Still others, such as the National Commission on Libraries and Information Science (NCLIS), the Information Infrastructure Task Force (IITF), or the Federal Communications Commission (FCC) provide regulatory or advisory functions related to libraries and the Internet.

This lack of coordination has resulted in conflicting program goals and objectives, reducing the overall effectiveness of the limited resources available to support library development onto the information superhighway, creating artificial walls between and among programs, i.e., stovepipe programs at the local level which are poorly coordinated, and confuse both the federal and the library community as to what programs are appropriate for what types of libraries in particular circumstances. Further, many of the programs are competitive grants in which many libraries are, for a host of reasons, unable to compete successfully against other applicants.

Policy Rhetoric versus Program Realities

The public statements by President Clinton, Vice President Al Gore, and others in the Administration regarding the role of libraries in the Internet are very positive and encouraging. Recently, for example, Assistant Secretary of Commerce, Larry Irving stated (1994, pp. 4-5):

> One of the most important things that has happened with regard to universal service was when the Vice President and President latched onto the idea of hooking up every library, classroom, hospital, and clinic by the year 2000. *That is the safety net for a lot of people* [emphasis added]. . . . If I want to make sure that every citizen has access to it [the information superhighway], I have to get it into public institutions.

Indeed, these public institutions will be the safety net for access, but a closer look at federal program support to achieve these goals, at least from the library perspective, is not encouraging.

For example, for FY 1995 the Administration requested no funds for the Higher Education Act (HEA) Title II which deals with college library technology, library research and demonstration, and library education -- to name but a few areas. The Administration's request for FY 1995 funding of Library Services and Construction

Act -- the mainstay by which many state libraries are supporting statewide networking initiatives -- was $26 million less than the 1994 appropriation at only $102 million. To date, Congressional committees have proposed restoration of some of these appropriations.

As another example, Vice President Gore recently visited the July 29, 1994 meeting of the National Commission on Libraries and Information Science (NCLIS) and stated (1994, p. 1-2), upon receiving the report Public Libraries and the Internet: Study Results, Policy Issues, and Recommendations (McClure et. al. 1994c):

> But there must be a concerted effort to ask the questions and to inventory the challenges and to come up with the best answers [related to the information superhighway]. There is a whole collection of those questions that has to do with the role of libraries. Copyright, telecommunication, connections, costs, technology, all kinds of stuff. This group [NCLIS] could play an enormously important role in helping the country answer those questions. [NCLIS should] ask those questions, inventory those challenges and respond to the questions that involve libraries' roles in the information superhighway.

Meanwhile, the Administration requested $901,000 for FY 1995 for NCLIS, down from NCLIS' 1994 appropriation of $903,000 -- which is inadequate for dealing with the issues and tasks at hand.

The federal programs related to supporting libraries and the Internet/NII are seriously inadequate, and recent Administration proposals have eroded those programs even more. The argument that the new NTIA TIIAP of $26 million will significantly benefit libraries is unclear -- at least in the short term (see below). The bottom line here is:

- Federal program support for libraries to accomplish National policy goals related to libraries' access to and use of the information superhighway are woefully inadequate.

- Program support for library connectivity is necessary but not sufficient; as Representative Boucher has proposed in HR 1757, support for training and applications development is also essential.

- Federal programs must be better coordinated both among Federal agencies and with state and local programs; they should support community-based solutions where schools, libraries, local government, and other organizations network together for Internet access and services rather than relying on stovepipe solutions, i.e., each unit doing its "own thing."

- An overhaul of LSCA, HEA, and other library programs in agencies such as NSF needs to be accomplished in light of National policy goals, libraries' existing involvement in the information superhighway, and the development of the NII.

While the policy goals related to libraries and the Internet are laudable -- as described in the "Libraries" section of Putting the Information Infrastructure to Work (Information Infrastructure Task Force, 1994b), the distance between rhetoric and actual federal program support in this policy area is significant.

INCREASING ACCESS TO THE INTERNET

Given existing Congressional and Administration policy goals to increase the public's access to the Internet, a number of strategies should be considered. Indeed, the federal policy and program framework to accomplish this goal will need to be flexible, evolutionary, and to some degree, experimental. The following are strategies for enhancing libraries' ability to increase public access to the Internet. They represent a range of opportunities for Congressional action.

Clarify Policy on Role of Libraries

Simply stated, is it National policy for libraries to serve as the access point of last resort to the Internet? Is it National policy for public libraries to serve as the safety net by which all members of the public have equal opportunity to access and use Internet resources and services and to obtain basic training in using the Internet? The National policy goal of "connecting libraries to the Internet by the year 2000" does not clarify the *role* that public libraries should play in a National networked information society. Nor does it clarify who, or what, exactly will serve as the access point of last resort and the public's safety net.

Traditional roles for public libraries in terms of preserving equal access to information for all the public support these new roles of the library as a community-based resource center that provides a range of Internet services and training for *both* the information haves and have-nots. As our recent studies suggest, many libraries are attempting to move into these new roles on the information superhighway. This transition, however, requires a range of support at the federal, state, and local level, and it would operate move effectively in the context of clear national policy regarding the role of public libraries in the networked society.

Policy can support and encourage libraries to develop partners and collaborate with other organizations to obtain resources necessary for Internet services. Clearly, the federal government, alone, cannot provide the resources needed. Indeed, "success stories" from a number of state library agencies demonstrate a wide range of techniques that can be used to leverage federal monies to obtain additional resources from local governments, foundations, and the private sector.

Continue and Expand Existing Programs

With some modifications, programs such as that currently being operated by NTIA should be continued and expanded. An NTIA preliminary analysis of the applications for the $26 million TIIAP showed that some $562 million had been requested. Of that $562 only $18 million were categorized as "library" based programs applications -- recognizing that libraries could have a component in other programs not formally categorized as "library" (NTIA, 1994b). We will not know actual awards until later this Fall. But, the relatively low level for library-based program applications can be explained, in part, by:

- The complexity of the applications procedures and the inability of many library organizations to marshall the necessary resources simply to propose a project meeting applications guidelines.

- Lack of knowledge about the NTIA program since traditionally, library program support has come from the Department of Education.

- The need for many libraries to request relatively small grants to promote their "readiness" to get connected to the Internet and learn how best to use networked information and services as part of their normal programming.

But in the near term the NTIA program, in and of itself, may not provide the level of support needed for libraries to transition into the information superhighway.

Nonetheless, the idea behind the NTIA program is a good one. That is, the grants are demand-based; they require collaboration and cost sharing at the local level; and they are competitive. With the likelihood of this program growing to $64 million for next fiscal year, NTIA should be encouraged to modify the overall program by:

- Drastically simplifying the applications procedures overall, and for public organizations and institutions with annual budgets of, say, less than $5 million allowing a "Quick Response Proposal" of five pages or less as the application form.

- Initiating an "Internet Readiness" program of one time only grants of, say $10,000 for public organizations and institutions with annual budgets of less than $5 million to purchase connectivity, equipment, and training. The grant would have to be matched, to some degree, with new monies from the local community.

- Publicizing the grants programs better to the public sector (especially the library community), offering training and/or information sessions about the program, and provide better lead time between announcement and application deadline.

Similar recommendations may be appropriate for the programs offered by the Department of Education and NSF related to libraries. Since the Science Subcommittee has oversight for NSF, it may be appropriate to inventory the programs that offer library support, review the applications to and awards from the programs, and determine how well they are meeting stated policy goals related to public access to the Internet.

The HEA, LSCA, and ESEA programs administered by the Department of Education target, respectively, higher education, public libraries, and schools. These programs can be better coordinated to encourage local schools, libraries, and educational institutions to work together, to leverage their resources on community based solutions to networking. The marginal cost for adding additional school or public libraries to a local area network that is then connected to the Internet is minimal -- as opposed to that school developing its own connection and infrastructure.

I would be pleased to discuss additional details of assessing the various federal funding approaches with Subcommittee staff. But, unless additional steps are taken, to simplify, publicize, and coordinate these programs, the library community -- as well as a host of other public organizations and institutions -- is not likely to receive adequate support from these programs.

Organize and Coordinate Federal Support for Libraries

The mish-mash of agencies and their programs involved in supporting libraries' transition to and use of the Internet to enhance public access is confusing at best. A number of strategies should be undertaken in this area:

- A lead agency or task group should be specifically designated to coordinate library programs related to the Internet and the NII. A group within the National Economic Council, the Information Infrastructure Task Force, the Department of Education, or perhaps an agency such as NTIA might take on this responsibility.

- The National Commission on Libraries and Information Science should be directed to develop a coordinated National plan defining the federal government's role in supporting library connections to and uses of the Information Superhighway.

- The National Commission, or perhaps another agency, should be directed to coordinate the collection and dissemination of descriptive data regarding the uses and applications of the Internet by libraries; national surveys such as the one we completed, Public Libraries and the Internet (McClure, et. al., 1994c), must be continued annually and for all types of libraries.

- Finally, we need an annual report that provides an agency "crosscut" of all programs supporting libraries in the Internet/NII providing program name, objectives, general description, budget, and activities.

A beginning model for the second strategy is the publication published by the Office of Science and Technology and the NSF, "Grand Challenges 1993: High Performance Computing and Communications." This annual report identified which agencies had what programs, with what budgets that were part of the HPCC initiative. A similar effort needs to be done for the NII initiative, overall, and more specifically, for library programs related to the Internet/NII.

Currently, there is considerable discussion about re-vamping the Library Services and Construction Act to better meet the needs of libraries in the networked society. I would propose that emphasis should not be on Construction, but rather Communications, and would rename this program to the Library Services and *Communications* Act with goals such as:

- Provide direct support for libraries to obtain basic computing and telecommunications equipment.
- Provide support for librarians and information professionals to obtain education and training related to the use of the Internet/NII and the development of network-based services.
- Help libraries obtain electronic government information that provide the public with access to this information.
- Support a National network literacy program in which librarians assume the responsibility of preparing the public to be productive and empowered in the networked society.
- Establish libraries as community-based network access centers that ensure and protect every person's access to networked information resources.
- Provide direct support to early innovators and successful experimental projects (such as those being done at Seattle Public Library) to diffuse the knowledge gained to other libraries.
- Promote the development of statewide networks.
- Evaluate "best practices" of the provision of networked information and conduct research related to libraries in the networked information environment.

LSCA, however, is but one component of the National policy supporting the library infrastructure. For example, the recently established National Education Goals, "Goals 2000" (P.L. 103-227) and programs such as the Internet-based AskEric service (ERIC Clearinghouse on Information and Technology, 1994), which provides Internet-based national reference and referral for educational information, should be carefully coordinated with library programs.

In addition, specific programs from the NSF intended for library development, Internet connectivity, or other networking support for libraries are unclear. Exactly what those programs are, the amounts available, and the library community's awareness of such programs requires additional investigation. Indeed, the degree to which the NSF directly supports the National policy goals related to libraries with specific programs and funds should be clarified.

A comprehensive review of other federal policies and programs affecting libraries should be conducted to identify ambiguities, gaps, problems, or conflicts. To develop a National plan for libraries to serve in the roles envisioned by Congress, we must first identify and coordinate the existing policy context in this policy area. The plan should address the coordination of federal, state, local and private initiatives relating library programs to the Internet/NII. NCLIS should be supported to coordinate the development of this plan.

Need for a Flexible and Dynamic Policy and Program Structure

Libraries cannot be easily generalized in terms of their use of the Internet and their sophistication with networking. Some libraries, such as Seattle Public Library, have innovative Internet-based library services and provide the public with direct access to the Internet. Other libraries have no connection and are relatively uninformed about the Internet. Some libraries have excellent local telecommunications infrastructure, others do not.

Thus, the policy and program structure to promote library Internet access needs to provide different types of support for libraries in different types of situations. For example:

- Readiness support: assisting the library to "get ready" to connect to the information superhighway by increasing the library's awareness of what it is, why it is important, and how it might actually connect to and use it.

- Access support: this includes support to obtain and install the necessary equipment and software as well as, perhaps, support for telecommunications charges.

- Applications support: assistance here could include training, support for curriculum development and learning modules, instruction on how to provide Internet-based programs and services, working with other local organizations to meet community needs, etc.

Clearly, program and policy support must also come from the state and the local community. While there can be program incentives that encourage libraries to get connected and provide public access, demand-based approaches, i.e., where local communities, individuals, or other public institutions request funds, such as those used in the NTIA program should be encouraged.

ACCEPTING THE CHALLENGE

The federal government, alone, cannot connect libraries to the Information Superhighway, promote network literacy, insure the public's access to electronic government information, and increase public access to the Internet via the Nation's libraries. It can, however, provide incentives and offer a range of encouragements where the library community, the public, state and local communities, and the private sector work together toward the policy goal of connecting libraries to the Internet and providing enhanced public access to the Internet via our libraries.

Currently, there is no coordinated National plan or policy to accomplish the Administration's policy goals in this area. How the federal government will support the development of libraries in (1) connecting to the Information Superhighway, (2) serving as the source of last resort or as a safety net to insure public access to the Information Superhighway, and (3) transitioning to an electronic, digital, and networked environment.

One vision of the Information Superhighway is to have libraries all connected to the national network. The library would be a community resource center for:

- Introducing new information technologies to the community
- Demonstrating applications and uses of networking
- Providing training to community residents on how to use the Internet
- Promoting collaboration among schools, local governments, and other community groups to use the Information Superhighway.

The library can also serve as a safety net, a place of last resort to access and use the Information Superhighway. Any person could access the array of information resources and services simply by using the "network room" in the library. Students could work interactively on lessons, adult learners could tap into endless instructional tools and persons, equal access to all types of information -- especially government information -- would be made possible.

Electronic resources or all types and forms would be publicly available for those who cannot connect from the home or workplace. Librarians and educators would serve as electronic intermediaries, navigators, and instructors -- being actively involved in assisting people best use the network. Parents, students, adult learners, educators and others could work interactively and inter-dependently on projects

and activities that we can only begin to imagine now. The library, as a non-partisan, publicly supported institution, with strong local community ties, is well-suited to serve in this role.

In a recent op-ed in the New York Times, Krugman notes that in the long run, technological advancements can be good for almost everyone. But in the short term, these changes strongly favor the most highly skilled and educated segments of society. He warns that such growing disparities can trigger social crisis as income gaps widen and certain segments of the population perceive themselves as chronically underemployed (Krugman, 1994). These gaps can occur just as easily within the existing middle class as in lower income segments. A major role for libraries and the larger education community in the networked society is to insure that these gaps are minimized and that equal opportunity to networked services and resources are available to the public.

The challenge before Congress and the Administration is to develop such a plan and implement programs that accomplish the plan's objectives. I look forward to working with this Subcommittee and other federal agencies to develop such a plan and to realize the Congressional goals of connecting libraries to the Internet and to enhance public access to the Information Superhighway.

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APPENDIX A

Dr. Charles R. McClure <cmcclure@suvm.acs.syr.edu> is Distinguished Professor at the School of Information Studies, Syracuse University, Syracuse, NY 13244 (315-443-2911). He teaches courses in U.S. government information management and policies, information resources management, library/information center management, research methods, and planning/evaluation of information services.

He completed his Ph.D. in Library and Information Services from Rutgers University. He is a member and has held a number of elective and committee positions, in the American Society for Information Science, the American Library Association, the Information Industry Association, and the Association for Library and Information Science Educators.

He has written extensively on topics related to U. S. government information, information resources management (IRM), and information policy including the co-authored works Federal Information Policies in the 1980's: Conflicts and Issues (Ablex, 1987); and Public Access to Government Information, Second edition (Ablex, 1988), and The National Research and Education Network (NREN): Research and Policy Issues (Ablex, 1991)

He has served as the principal investigator for studies related to the management of government information and information policy, by agencies such as the U.S. Congress Office of Technology Assessment, the National Technical Information Service, the Bureau of the Census, and the National Science Foundation. He was the principal investigator of a study, completed in January, 1993, funded by the Office of Technology Assessment, entitled Federal Information Policy and Management for Electronic Service Delivery. In June, 1994, he completed a national survey, Public Libraries and the Internet, on the use of the Internet by public libraries, funded and published by the National Commission on Libraries and Information Science.

His research funded by The U.S. Office of Management and Budget produced Identifying and Describing Government Information Inventory Locator Systems: Design for Networked-Based Locators (Washington, DC: National Audio-Visual Center, 1992). Funding from the U.S. Geological Survey supported the 1994 project resulting in the report Expanding Research and Development on the NISO Z39.50 Search and Retrieval Standard for the Government Information Locator System (GILS).

He also has conducted research on library management topics. He served as the principal investigator for the Public Library Development Project, funded by the Public Library Association, which resulted in the 1987 ALA publication of Planning and Role Setting for Public Libraries and Output Measures for Public Libraries, (2nd ed.), both of which McClure is a co-author. He continued research in this area with the publication of the 1991 report Development of a Planning, Service Roles, and Performance Measures Manual for Academic Health Science Libraries, (available through ERIC) funded by the Association of Academic Health Sciences Library Directors.

Some of his other works related to library management and services include the monographs Performance Measures for Academic and Research Libraries (Chicago: ALA, 1990) and Evaluation and Library Decision making (Ablex, 1990). He also completed the co-edited book Library and Information Science Research: Perspectives and Strategies for Improvement (Ablex, 1991). His most recent book is Libraries and the Internet/NREN: Perspectives, Issues, and Opportunities (Meckler, 1994). He has authored/edited some 30 monographs and more than 200 reports and articles.

His research has won national awards from the American Library Association, the Association of Library and Information Science Education, and the American Society for Information Science. His co-authored study Federal Information Policies in the 1980s: Issues and Conflicts (Ablex, 1987) was recognized by the American Society for Information Science as the best book in information science for 1988. His co-authored study, Electronic Networks, the Research Process, and Scholarly Communication: An Empirical Study with Policy Recommendations for the National Research and Education Network, receivcd the Jesse H. Shera award for the best research study in library/information science for 1990 -- the third time that he has won that award.

Currently, McClure is funded by the National Science Foundation to study "Policy Issues in Assessing the Role of the Public Libraries in the NII," and from the U.S. Department of Education to investigate "Assessing the Impacts of the Internet/NREN Networking on the Academic Institution." Both projects are scheduled for completion in 1995. McClure also serves as Associate Editor of Government Information Quarterly and is the founding Editor of Internet Research: Electronic Networking Applications and Policy.

In 1994 he was named "Distinguished Professor" at Syracuse University, only one of eight ever to receive that honor. He was named by the National Commission on Libraries and Information Science as "Distinguished Researcher" in 1993. As president of Information Management Consultant Services, Inc., he consults with a number of academic, public, and special libraries; government agencies; professional associations; networks and electronic service providers; and corporations regarding the design, implementation, management, and evaluation of information services. He is a frequent speaker at professional meetings and conferences.

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